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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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For related information see also *34 Fluid Mechanics and Heat Transfer*.

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Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 870
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE N.A.
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 871
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 871
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 872
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 881
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 890
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 891
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 891

Note: N.A. means that no abstracts were assigned to this category for this issue.

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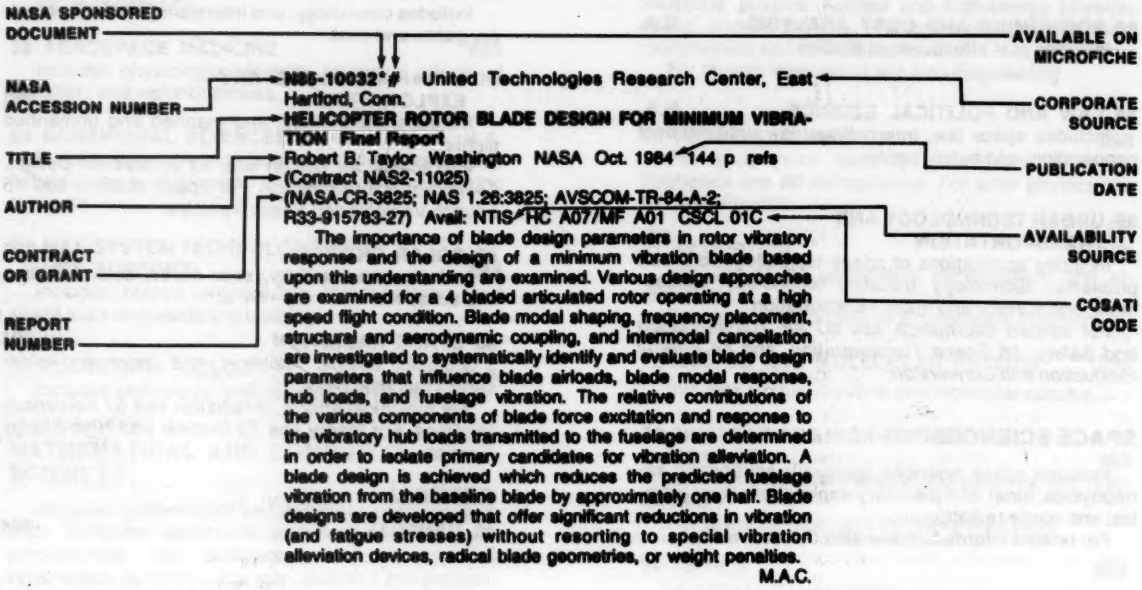
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N85-10032*# United Technologies Research Center, East Hartford, Conn.
CORPORATE SOURCE
TITLE
HELICOPTER ROTOR BLADE DESIGN FOR MINIMUM VIBRATION Final Report
PUBLICATION DATE
AUTHOR
Robert B. Taylor Washington NASA Oct. 1984 144 p refs
CONTRACT OR GRANT
(Contract NAS2-11025)
REPORT NUMBER
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AVAILABILITY SOURCE
COSATI CODE
The importance of blade design parameters in rotor vibratory response and the design of a minimum vibration blade based upon this understanding are examined. Various design approaches are examined for a 4 bladed articulated rotor operating at a high speed flight condition. Blade modal shaping, frequency placement, structural and aerodynamic coupling, and intermodal cancellation are investigated to systematically identify and evaluate blade design parameters that influence blade airloads, blade modal response, hub loads, and fuselage vibration. The relative contributions of the various components of blade force excitation and response to the vibratory hub loads transmitted to the fuselage are determined in order to isolate primary candidates for vibration alleviation. A blade design is achieved which reduces the predicted fuselage vibration from the baseline blade by approximately one half. Blade designs are developed that offer significant reductions in vibration (and fatigue stresses) without resorting to special vibration alleviation devices, radical blade geometries, or weight penalties.
M.A.C.

VOLUME 23 NUMBER 6 MARCH 23, 1985

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N85-14786*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN OVERVIEW OF SOME MONOPLANAR MISSILE PROGRAMS
M. Leroy Spearman Dec. 1984 33 p refs Presented at the Joint Serv. Guidance and Control Comm. Workshop on Bank-to-Turn Controlled Terminal Homing Missiles, Laurel, Md., 19-20 Sep. 1984 Previously announced in IAA as A84-42280
(NASA-TM-86330; NAS 1.15:86330) Avail: NTIS HC A03/MF A01 CSCL 01B

A historical review is presented of some monoplanar missile systems in which the vehicle flight control was similar to that for a conventional aircraft. The review is essentially chronological, beginning prior to World War I, and includes worldwise programs. Illustrative examples of aerodynamic research with monoplanar missiles are presented including some comparisons with cruciform missiles. Some examples of current programs are presented and some particular mission applications for monoplanar systems are discussed. Author (AIAA)

N85-14787*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF SOME LIFTING REENTRY CONCEPTS APPLICABLE TO TRANSATMOSPHERIC VEHICLE DESIGN STUDIES
M. Leroy Spearman Dec. 1984 31 p Presented at the AIAA 2nd Appl. Aerodyn. Conf., Seattle, 21-23 Aug. 1984 Previously announced in IAA as A84-41326
(NASA-TM-86331; NAS 1.15:86331; AIAA-Paper-84-2146) Avail: NTIS HC A03/MF A01 CSCL 01B

The aerodynamic characteristics of some lifting reentry concepts are examined with a view to the applicability of such concepts to the design of possible transatmospheric vehicles (TAV). A considerable amount of research has been done in past years with vehicle concepts suitable for manned atmospheric-entry, atmospheric flight, and landing. Some of the features of these concepts that permit flight in or out of the atmosphere with maneuver capability should be useful in the mission requirements of TAV's. The concepts illustrated include some hypersonic-body shapes with and without variable geometry surfaces, and a blunt lifting-body configuration. The merits of these concepts relative to the aerodynamic behavior of a TAV are discussed. Author (IAA)

N85-14788*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE AERODYNAMICS OF SOME GUIDED PROJECTILES
M. Leroy Spearman Dec. 1984 24 p refs Previously announced in IAA as A84-42373
(NASA-TM-86334; NAS 1.15:86334) Avail: NTIS HC A02/MF A01 CSCL 01B

Some characteristic projectile shapes are considered with various added components intended to provide lift, stability, and control. The intent of the additions is to provide some means for altering the normal ballistic flight path of a projectile for various purposes such as: achieving greater accuracy at the impact point, selecting alternate impact points, extending range, improved evasion, and so on. The configurations presented illustrate the effects of a flare, wings, and tails for providing stability and lift, and the effects of aft-tails, a close-coupled flap, and all-moving forward wings for control. The relative merits of the various configurations, all of which provided for flight path alterations are discussed. Author (AIAA)

N85-14789# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
17 Dec. 1984 110 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-84-042) Avail: NTIS HC A06/MF A01

Activities are reported in the development and marketing of microcomputers and computer programs. The design and capabilities of supersonic fighter aircraft is discussed as well as the X-ray spectra of laser plasmas and a nuclear pumped X-ray laser. The use of a serum specific DNA polymerase in hepatitis B is recommended. For individual titles, see N85-14790 through N85-14795.

N85-14790# Joint Publications Research Service, Arlington, Va.
NEW FIGHTER AIRCRAFT REPORTED
In its China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 19-20 Transl. into ENGLISH from Hangkong Zhishi (Beijing), no. 10, Oct. 1984 p 22 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

Assessments of Chinese aerotechnology as reported in U.S. periodicals are provided. Particular emphasis is on the delay (since 1970) in producing the F-8 delta wing fighter aircraft. The principal reason for this delay is considered to be the inability to produce a suitable jet engine to power the aircraft. A.R.H.

N85-14791# Joint Publications Research Service, Arlington, Va.
F-7 SUPERSONIC DAY FIGHTER VIEWED
Liu Zhen *In its* China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 21-24 Transl. into ENGLISH from Guoji Hangkong (Beijing), no. 9, 5 Sep. 1984 p 4-5 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

Produced in China in the mid-1960's, the Jian-7 aircraft is a delta wing with nose air intake. The airframe is mainly of aluminum alloy and the power plant is one turbojet engine with an afterburning thrust of 5,100 kilograms. High altitude maximum speed is about Mach 2. Improvements made to permit the aircraft to remain airborne longer, to assure reliability of the ejection seats, and to facilitate adjustment of the air intake ducts are cited. A cannon was also added to augment close-combat firepower. The armament on the aircraft and fire control electronic equipment are also described. A.R.H.

N85-14792# Joint Publications Research Service, Arlington, Va.
A-5 SUPERSONIC ATTACK AIRCRAFT DESCRIBED
Ke Min *In its* China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 25-28 Transl. into ENGLISH from Guoji Hangkong (Beijing), no. 9, 5 Sep. 1984 p 2-3 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

Technical and tactical data are presented for the Qiang-5 aircraft designed for the high-speed penetration of defenses at low or minimum altitudes to provide close air support to ground units. First test flown in 1965, the aircraft can attack many kinds of ground targets and can conduct both level bombing and dive bombing attacks. Its cannons and rockets can be used in self-defensive aerial combat and the aircraft can also carry air-to-air missles. A.R.H.

N85-14793# Joint Publications Research Service, Arlington, Va.
DETAILS OF EXPORT A-5 CLOSE-SUPPORT AIRCRAFT GIVEN
In its China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 29-32 Transl. into ENGLISH from Hangkong Zhishi (Beijing), no. 9, Sep. 1984 p 12-13 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

Designated the Fantan A aircraft by NATO, China's A-5 aircraft is a single seat, twin engined supersonic attack aircraft that is capable of level flying as well as diving to execute its air to surface mission. Air to air missiles and guns are used for its defense. Technical specifications of the aircraft and its performance characteristics are discussed. A.R.H.

N85-14794# Joint Publications Research Service, Arlington, Va.
MEASUREMENTS OF X-RAY SPECTRA FROM LASER PRODUCED PLASMA c75
Yang Jianguo and Li Ruolan *In its* China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 33-42 refs Transl. into ENGLISH from Hejubian Yu Dengliziti Wuli (Chongqing), v. 4, no. 2, 15 Jun. 1984 p 102-107 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

The continuous X-ray spectra from 1.5 to 100 keV emitted by a laser produced plasma were measured with a K-edge filter and a filter fluorescence arrangement. The methods for measuring the X-ray spectra and the multichannel X-ray spectrometer are described. Experimental results of laser fusion experiments are presented. Author

N85-14795# Joint Publications Research Service, Arlington, Va.
ESTIMATE OF NUCLEAR-PUMPED X-RAY LASER MECHANISM c36
Lu Renxiang *In its* China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 43-49 refs Transl. into ENGLISH from Hejubian Yu Dengliziti Wuli (Chongqing), v. 4, no. 4, Jun. 1984 p 86-90 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

It is proposed that the recently reported 14A X-ray laser is due to the n = 5 to n = 3 transition of the recombining hydrogen-like plasma of Z = 30 (zinc). When the stimulated radiation builds up, the size of the reacting material is about phi 3.36 mm x 2 mm. The X-ray flux of the nuclear explosion should be greater than 10 to the 15th power W/sq cm with an energy greater than 12.2 keV, the total ionization energy of zinc. Miniaturized hydrogen bomb of several hundred tons of TNT might have been used. It is suggested that the zinc wire may be doped with selenium to strengthen the 14A X-ray laser by resonant optical excitation. Author

N85-14807*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUPERAUGMENTED ROTORCRAFT PROGRAM
R. D. Showman *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 7-12 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01B

N85-14810*# Army Aviation Center, Fort Rucker, Ala.
ARMY AVIATION TODAY AND TOMORROW
George Philips *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 35-54 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01B

N85-14811*# Marine Corps Tactical Systems Support Activity, Camp Pendleton, Calif.
MARINE HELICOPTER MISSIONS
Steve Hill *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 55-74 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01B

N85-14812*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CIVIL LAW ENFORCEMENT MISSIONS
Robert M. Morrison (Huntington Beach Police Dept., Calif.) *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 75-80 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01B

N85-14813*# Sikorsky Aircraft, Stratford, Conn.
SAR MARITIME MISSIONS
David A. Young *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 81-94 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01B

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N85-14796*# Stanford Univ., Calif. Joint Inst. for Aeronautics and Acoustics.
AN EXPERIMENTAL STUDY OF AIRFOIL-SPOILER AERODYNAMICS
B. G. McLachlan and K. Karamcheti Feb. 1985 88 p refs (Contract NCC2-74)
(NASA-CR-177328; NAS 1.26:177328; SU-JIAA-TR-52) Avail: NTIS HC A05/MF A01 CSCL 01A

The steady/unsteady flow field generated by a typical two dimensional airfoil with a statically deflected flap type spoiler was investigated. Subsonic wind tunnel tests were made over a range of parameters: spoiler deflection, angle of attack, and two Reynolds numbers; and comprehensive measurements of the mean and fluctuating surface pressures, velocities in the boundary layer, and velocities in the wake. Schlieren flow visualization of the near wake structure was performed. The mean lift, moment, and surface pressure characteristics are in agreement with previous investigations of spoiler aerodynamics. At large spoiler deflections, boundary layer character affects the static pressure distribution in the spoiler hingeline region; and, the wake mean velocity fields reveals a closed region of reversed flow aft of the spoiler. It is shown that the unsteady flow field characteristics are as follows: (1) the unsteady nature of the wake is characterized by vortex shedding; (2) the character of the vortex shedding changes with spoiler deflection; (3) the vortex shedding characteristics are in agreement with other bluff body investigations; and (4) the vortex shedding frequency component of the fluctuating surface pressure field is of appreciable magnitude at large spoiler deflections. The flow past an airfoil with deflected spoiler is a particular problem in bluff body aerodynamics is considered. E.A.K.

N85-14797*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC INTERNAL PERFORMANCE OF SINGLE-EXPANSION-RAMP NOZZLES WITH VARIOUS COMBINATIONS OF INTERNAL GEOMETRIC PARAMETERS
Richard J. Re and Laurence D. Leavitt Dec. 1984 81 p refs
(NASA-TM-86270; L-15814; NAS 1.15:86270) Avail: NTIS HC A05/MF A01 CSCL 01A

The effects of five geometric design parameters on the internal performance of single-expansion-ramp nozzles were investigated at nozzle pressure ratios up to 10 in the static-test facility of the Langley 16-Foot Transonic Tunnel. The geometric variables on the expansion-ramp surface of the upper flap consisted of ramp chordal angle, ramp length, and initial ramp angle. On the lower flap, the geometric variables consisted of flap angle and flap length. Both internal performance and static-pressure distributions on the centerlines of the upper and lower flaps were obtained for all 43 nozzle configurations tested. Author

N85-14798*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A THREE-DIMENSIONAL AXISYMMETRIC CALCULATION PROCEDURE FOR TURBULENT FLOWS IN A RADIAL VANELESS DIFFUSER
Lawrence F. Schumann [1984] 17 p refs Proposed for presentation at the 30th Intern. Gas Turbine Conf. and Exhibit, Houston, Tex., 17-21 Mar. 1985; sponsored by the American Society of Mechanical Engineers
(NASA-TM-86903; E-2387; NAS 1.15:86903;
USAAVSCOM-TR-84-C-21) Avail: NTIS HC A02/MF A01 CSCL 01A

An analytical model is proposed to calculate the three-dimensional axisymmetric turbulent flowfield in a radial vaneless diffuser. The model assumes that the radial and tangential boundary layer profiles are approximated by power law profiles. Then, using the integrated radial and tangential momentum and continuity equations for the boundary layer and corresponding inviscid equations for the core flow, there results six ordinary differential equation in six unknowns which are easily solved using a Runge-Kutta technique. A model is also proposed for fully developed flow. The results using this technique were compared with the results from a three-dimensional viscous, axisymmetric duct code and with experimental data and good quantitative agreement was obtained. Author

N85-14799*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF UNIFORM PERTURBATION SOLUTIONS AND NUMERICAL SOLUTIONS FOR SOME POTENTIAL FLOWS PAST SLENDER BODIES Final Report
Tin-Chee Wong (George Washington Univ., Washington, D.C.), C. H. Liu, and James Geer (State Univ. of New York, Binghamton) Oct. 1984 34 p refs
(Contracts NAS1-17070; NAS1-14605)
(NASA-CR-172485; ICASE-84-56; NAS 1.26:172485) Avail: NTIS HC A03/MF A01 CSCL 01A

Approximate solutions for potential flow past an axisymmetric slender body and past a thin airfoil are calculated using a uniform perturbation method and then compared with either the exact analytical solution or the solution obtained using a purely numerical method. The perturbation method is based upon a representation of the disturbance flow as the superposition of singularities distributed entirely within the body, while the numerical (panel) method is based upon a distribution of singularities on the surface of the body. It is found that the perturbation method provides very good results for small values of the slenderness ratio and for small angles of attack. Moreover, for comparable accuracy, the perturbation method is simpler to implement, requires less computer memory, and generally uses less computation time than the panel method. In particular, the uniform perturbation method yields good resolution near the regions of the leading and trailing edges where other methods fail or require special attention. Author

N85-14800*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIPLE STEADY STATES FOR CHARACTERISTIC INITIAL VALUE PROBLEMS Final Report
M. D. Salas, S. Abarbanel, and D. Gottlieb Nov. 1984 45 p refs (Contract NAS1-17070)
(NASA-CR-172486; ICASE-84-57; NAS 1.26:172486) Avail: NTIS HC A03/MF A01 CSCL 01A

The time dependent, isentropic, quasi-one-dimensional equations of gas dynamics and other model equations are considered under the constraint of characteristic boundary conditions. Analysis of the time evolution shows how different initial data may lead to different steady states and how seemingly anamolous behavior of the solution may be resolved. Numerical experimentation using time consistent explicit algorithms verifies the conclusions of the analysis. The use of implicit schemes with very large time steps leads to erroneous results. Author

N85-14801# National Aerospace Lab., Tokyo (Japan).
DEVELOPMENT OF THE CODE NSFOIL FOR ANALYZING HIGH REYNOLDS NUMBER TRANSONIC FLOW AROUND AN AIRFOIL
Nobuhiro Kawai and Naoki Hirose Jun. 1984 29 p refs In JAPANESE; ENGLISH summary
(NAL-TR-816; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A computer code, called NSFOIL, has been developed for analyzing high Reynolds number transonic flow around an airfoil. The implicit approximate factorization scheme for the Navier-Stokes equations with an algebraic eddy viscosity model of the turbulent boundary layer is used with the implicit boundary condition on the airfoil and the wake cut boundary. The present code contains various option parameters for physical models, and I/O forms, i.e., full or thin layer approximate NS equations, fully turbulent or transition models of boundary layer, etc. Emphasis is put on the various output forms of the computed results to provide aerodynamics designers with full information on aerodynamic, boundary layer and wake characteristics including shock-induced separation and trailing edge separation phenomena. Some of the computed results are presented and compared with the wind tunnel experiment results. In the appendix, the operation manual of the code is described. Author

N85-14802*# Analytical Methods, Inc., Bellevue, Wash.
PROGRAM VSAERO: A COMPUTER PROGRAM FOR CALCULATING THE NON-LINEAR AERODYNAMIC CHARACTERISTICS OF ARBITRARY CONFIGURATIONS: USER'S MANUAL
B. Maskew Dec. 1982 176 p
(Contract NAS2-8788)
(NASA-CR-166476; NAS 1.26:166476) Avail: NTIS HC A09/MF A01 CSCL 01A

VSAERO is a computer program used to predict the nonlinear aerodynamic characteristics of arbitrary three-dimensional configurations in subsonic flow. Nonlinear effects of vortex separation and vortex surface interaction are treated in an iterative wake-shape calculation procedure, while the effects of viscosity are treated in an iterative loop coupling potential-flow and integral boundary-layer calculations. The program employs a surface singularity panel method using quadrilateral panels on which doublet and source singularities are distributed in a piecewise constant form. This user's manual provides a brief overview of the mathematical model, instructions for configuration modeling and a description of the input and output data. A listing of a sample case is included. Author

N85-14974# Joint Publications Research Service, Arlington, Va.
AERODYNAMIC AND THERMAL CHARACTERISTICS OF STELLATE BODIES IN HYPERSONIC FLOW OF RAREFIED GAS AT ANGLE OF ATTACK Abstract Only
A. I. Bunimovich and V. I. Kuzmenko *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 39 Transl. into ENGLISH from Vestn. Mosk. Univ. Ser. 1: Mat., Mekhan. (Moscow), no. 2, Mar.-Apr. 1984 p 74-77 (For primary document

see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14976# Joint Publications Research Service, Arlington, Va.
TRANSONIC FLOW OF ELASTIC MEDIUM PAST SLENDER SOLID BODY Abstract Only
I. V. Simonov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 40-41 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 1, Jan.-Feb. 1984 p 114-122 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14978# Joint Publications Research Service, Arlington, Va.
LINEAR PROBLEM OF HARMONIC VIBRATOR ACTING AT SUPERCRITICAL FREQUENCIES IN SUBSONIC BOUNDARY LAYER Abstract Only
Ye. D. Terentyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 42 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 264-272 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14979# Joint Publications Research Service, Arlington, Va.
HYPERSONIC FLOW OF MIXTURE AROUND BLUNT BODY Abstract Only
A. Ya. Sagomonyan *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 43 Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. 1: Mat. i Mekhan. (Moscow), no. 3, May-Jun. 1984 p 54-62 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N85-14803# Toronto Univ., Downsview (Ontario).
A STUDY OF CRASHWORTHINESS OF LIGHT AIRCRAFT FUSELAGE STRUCTURES: A NUMERICAL AND EXPERIMENTAL INVESTIGATION
Asifa Peter Nanyaro Sep. 1984 193 p refs Sponsored by Natural Sciences and Engineering Research Council of Canada and Canadian Transportation Development Agency
(UTIAS-286; ISSN-0082-5255) Avail: NTIS HC A09/MF A01

A combined analytical and experimental program was undertaken to study the crashworthiness of light aircraft fuselage structures. In the analytical study, a self-consistent system of equations was developed using the finite element method. These equations were linearized (in terms of displacements and angular velocities) and extended to include material nonlinearities. Rib and curved plate elements which include all rigid-body modes were also derived utilizing a matrix formulation to provide ease in programming. The system of equations was then solved using an implicit Newmark-Beta method with the Frontal Solver routine, that avoids inverting the matrices at every time step. This technique requires smaller computer storage than a banded storage method and has other implicit advantages such as stability and accuracy. In addition, a pendulum gantry crash facility was designed and constructed to test scale model stiffened aluminum fuselage structures in a simulated free-flight impact mode. Tests were carried out and dynamic measurements were made of selected g-loads (accelerations) and component strains. B.W.

N85-14804# National Center for Atmospheric Research, Boulder, Colo. Joint Airport Weather Studies.
STATISTICS FROM THE OPERATION OF THE LOW-LEVEL WIND SHEAR ALERT SYSTEM (LLWAS) DURING THE JOINT AIRPORT WEATHER STUDIES (JAWS) PROJECT Interim Report, May - Sep. 1982
A. J. Bedard, Jr., J. McCarthy, and T. Lefebvre Washington DOT Dec. 1984 86 p refs
(Contract DTFA01-82-Y-10513)
(DOT/FAA/PM-84/32; NCAR-01-83) Avail: NTIS HC A05/MF A01

The Low-Level Wind Shear Alert System (LLWAS) system operated from May through September 1982 as a part of the Joint Airport Weather Studies (JAWS) experiment. The data base obtained provided statistics and case studies permitting evaluation of the LLWAS system and comparisons with other low-altitude measuring systems. Analyses of the data set indicate LLWAS capabilities requiring improvements. These include: better spatial resolution, improved detection algorithms, and application of internal system checks for maintenance and evaluation. There is a great need to record and analyze existing LLWAS at airports not only to evaluate specific system operation but also to develop detailed climatologies of airport wind shear. Author

N85-14805# National Transportation Safety Board, Washington, D. C. Bureau of Safety Programs.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA: US GENERAL AVIATION, CALENDAR YEAR, 1981
6 Aug. 1984 156 p refs
(PB84-230960; NTSB/ARG-84/02) Avail: NTIS HC A08/MF A01 CSCL 01B

This report presents a statistical compilation and review of general aviation accidents which occurred in 1981. The accidents reported are all those involving U.S. registered aircraft not conducting air carrier revenue operations under 14 CFR 121, 14 CFR 127, or 14 CFR 135. The report is divided into sections, each of which presents a review of a subset of all general aviation accidents. Each subset represents aircraft of similar types or aircraft being operated for particular purposes. Several tables present accident parameters for 1981 only, and each section includes tabulations which present comparative statistics for 1981 and for the five-year period 1976-1980. Author (GRA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N85-14806*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TECHNICAL WORKSHOP: ADVANCED HELICOPTER COCKPIT DESIGN
John C. Hemingway, ed. and George P. Callas, ed. Dec. 1984 346 p refs Workshop held at Moffett Field, Calif., 26-28 Jul. 1983
(NASA-CP-2351; Rept-85057; NAS 1.55:2351) Avail: NTIS HC A15/MF A01 CSCL 01D

Information processing demands on both civilian and military aircrews have increased enormously as rotorcraft have come to be used for adverse weather, day/night, and remote area missions. Applied psychology, engineering, or operational research for future helicopter cockpit design criteria were identified. Three areas were addressed: (1) operational requirements, (2) advanced avionics, and (3) man-system integration. For individual titles, see N85-14807 through N85-14829.

N85-14807*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUPERAUGMENTED ROTORCRAFT PROGRAM c01
R. D. Showman *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 7-12 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01B

Concepts, design criteria, and methodology will be examined in four areas: control systems, guidance systems, cockpit dialogue systems, and the integrated intelligence. The approach is to investigate these areas in an individual manner through analysis and simulation and in an integrated manner through simulation and flight. Finally, the integrated concepts will be validated in flight. B.G.

N85-14808*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HELICOPTER HUMAN FACTORS PROGRAMS AND PLANS **c54**

E. M. Huff *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 13-22 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 05H

Design concepts for pilot interaction with highly computerized systems and particularly the dialog aspects (transfer of information back and forth between the pilot and the system) are examined. Principles for blending the various input-output media are needed. Applied artificial intelligence aspects dealing with input and output grammar, message understanding, and message prioritization are studied. B.G.

N85-14809*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

GUIDANCE AND NAVIGATION PROGRAMS AND PLANS

D. G. Denery *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 23-34 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 17G

System technology concepts for all weather helicopter operations in both remote and high density areas were examined. The SH-36 was used to support the remote area investigations. The primary emphasis was on the development of advanced navigation concepts to allow rotorcraft to land in remote areas where there may not be a ground based navigational aid. The focus was on the used airborne weather radar, the use of high resolution radar and satellite based navigation concepts. The high density work was conducted using the UH-1H system that allows alternate guidance and navigation algorithms to be tested in flight. B.G.

N85-14810*# Army Aviation Center, Fort Rucker, Ala.

ARMY AVIATION TODAY AND TOMORROW **c01**

George Philips *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 35-54 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01B

Military helicopters and their functions in combat are described. Electronic countermeasures, target acquisition, surveillance, reconnaissance, weapons systems, night flight capability, troop transport, and nap-of-the-earth navigation are discussed. B.G.

N85-14811*# Marine Corps Tactical Systems Support Activity, Camp Pendleton, Calif.

MARINE HELICOPTER MISSIONS **c01**

Steve Hill *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 55-74 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01B

The four different helicopters in the Marine Corps inventory and the mission of each one described. B.G.

N85-14812*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CIVIL LAW ENFORCEMENT MISSIONS **c01**

Robert M. Morrison (Huntington Beach Police Dept., Calif.) *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 75-80 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01B

The user requirements for law enforcement, fire departments, paramedic, rescue, conservation and federal government agencies who use helicopters as a routine part of their operations are discussed. B.G.

N85-14813*# Sikorsky Aircraft, Stratford, Conn.

SAR MARITIME MISSIONS **c01**

David A. Young *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 81-94 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01B

The U.S. Coast Guard missions (search and rescue, enforcement of laws and treaties, marine environmental patrol, and light utility transport) are discussed. B.G.

N85-14814*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SOME THOUGHTS ON THE IMPLEMENTATION OF PILOT NIGHT VISION DEVICES FOR HELICOPTERS **c06**

George E. Tucker *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 95-104 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01D

Night vision enhancement devices greatly expand the range and quality of services by extending night operational capabilities. Evolving military tactical concepts for helicopters survivability and battlefield effectiveness necessitate nap-of-the-earth (NOE) flying under both day and night conditions. From a pilot workload standpoint, flying a helicopter NOE in day VFR conditions with minimum clearance between rotors and obstacles is quite demanding. Doing the same job at night is several times more difficult. There are two general categories of night vision devices in operation in helicopter aviation: the Night Vision Goggles (NVG) and forward looking infrared (FLIR) system. The capabilities and limitations of those two devices are discussed. B.G.

N85-14815*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HH-65A DOLPHIN DIGITAL INTEGRATED AVIONICS **c06**

R. B. Huntoon *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 107-120 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01D

Communication, navigation, flight control, and search sensor management are avionics functions which constitute every Search and Rescue (SAR) operation. Routine cockpit duties monopolize crew attention during SAR operations and thus impair crew effectiveness. The United States Coast Guard challenged industry to build an avionics system that automates routine tasks and frees the crew to focus on the mission tasks. The HH-64A SAR avionics systems of communication, navigation, search sensors, and flight control have existed independently. On the SRR helicopter, the flight management system (FMS) was introduced. H coordinates or integrates these functions. The pilot interacts with the FMS rather than the individual subsystems, using simple, straightforward procedures to address distinct mission tasks and the flight management system, in turn, orchestrates integrated system response. B.G.

N85-14816*# Sperry Rand Corp., Blue Bell, Pa.

INTEGRATED COCKPIT DESIGN FOR THE ARMY HELICOPTER IMPROVEMENT PROGRAM **c05**

T. Drennen and B. Bowen (Textron Bell Helicopter, Fort Worth, Tex.) *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 121-144 (For primary document see N85-14806 06-04)

Avail: NTIS HC A15/MF A01 CSCL 01C

The main Army Helicopter Improvement Program (AHIP) mission is to navigate precisely, locate targets accurately, communicate their position to other battlefield elements, and to designate them for laser guided weapons. The onboard navigation and mast-mounted sight (MMS) avionics enable accurate tracking of current aircraft position and subsequent target location.

The AHIP crewstation development was based on extensive mission/task analysis, function allocation, total system design, and test and verification. The avionics requirements to meet the mission was limited by the existing aircraft structural and performance characteristics and resultant space, weight, and power restrictions. These limitations and night operations requirement led to the use of night vision goggles. The combination of these requirements and limitations dictated an integrated control/display approach using multifunction displays and controls. B.G.

N85-14817*# International Business Machines Corp., Owego, N.Y.
HH-60D NIGHT HAWK HELICOPTER c05
C. S. Richardson *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 145-164 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

Fundamental development issues, system requirements and improvements are reported for the HH-60D night hawk helicopter. The HH-60D mission requirements are for combat search and rescue (aerospace rescue and recovery service user based at Scott AFB) and special operations (special operations forces based at Hurlburt AFB). Cockpit design, computer architecture and software are described in detail. B.W.

N85-14818*# Naval Air Development Center, Warminster, Pa.
AVIONICS/CREW STATION INTEGRATION c06
William G. Mulley *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 165-172 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

The U.S. Navy has been encouraging advanced development concepts aimed at increasing the aircraft instrumentation performance for multi-platform applications of 1990's weapons systems. The three areas covered by the Navy's research and development effort are: System Integration, Technology, and Human Factors. The System Integration objectives are to produce a system architecture easily adaptable to many platforms. Technology objectives are to determine the state of the art for displays, electronics, and controls. The Human Factors objectives are to determine the proper human-machine interfaces so that the ultimate crew station will be capable of providing the pilot with the proper display and controls performance to satisfy the diverse requirements of a fighter, attack, ASW, fixed-wing, rotary-wing, and V/STOL platforms in both a one-man crew or two-man crew matrix. All data/control interface among units of this crew station and other platform subsystems will be via digital data buses and video multiplex buses. No individual discrete signal, data, or control lines will be needed. This paper discusses the six interfaces necessary to ensure the optimum development of this crew station, the predicted platform mission improvements, and the requisite life-cycle cost considerations. This concept will serve as a basis for planning the integration of the necessary hardware and software features in current and future weapons systems. B.W.

N85-14819*# Miami Univ., Coral Gables, Fla.
HUMAN FACTORS IN COCKPIT AUTOMATION c54
Earl L. Wiener *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 173-186 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

The rapid advance in microprocessor technology has made it possible to automate many functions that were previously performed manually. Several research areas have been identified which are basic to the question of the implementation of automation in the cockpit. One of the identified areas deserving further research is warning and alerting systems. Modern transport aircraft have had one after another warning and alerting systems added, and computer-based cockpit systems make it possible to add even more. Three major areas of concern are: input methods (including voice, keyboard, touch panel, etc.), output methods and displays (from traditional instruments to CRTs, to exotic displays including the human voice), and training for automation. Training for operating highly automatic systems requires considerably more attention than it has been given in the past. Training methods have not kept pace with the advent of flight-deck automation. B.W.

N85-14820*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTELLIGENT INTERFACES FOR TACTICAL AIRBORNE PLATFORMS c54
Azad Madni *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 187-196 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

Enhanced capabilities of tactical airborne platforms have resulted in increased number of aircrew tasks, greater task complexity, and increased time-stress in task performance. Embedded intelligence in the aircrew-vehicle interface (AVI) can help alleviate aircrew workload and enhance aircrew performance by: (1) optimizing the exchange of information between the aircrew and the onboard automation; and (2) adaptively allocating functions between aircrew and automation in response to situational demands. Intelligent interface issues are addressed in this report such as: (1) how to ensure that the aircrew can cope with the information influx; (2) how to present/portray both situational and internal status information; (3) how to allocate functions between the aircrew and the onboard automation; and (4) how to explain reasoning processes employed by onboard intelligence to the aircrew. B.W.

N85-14821*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
HUMAN FACTORS OF VISUAL DISPLAYS c54
Harry L. Snyder *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 197-202 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

Several human factors issues in visual displays are addressed in this report. They are as follows: (1) the importance of luminance range and contrast; (2) uniformity of visual displays; (3) image quality; (4) color contrast; and (5) dot matrix fonts. B.W.

N85-14822*# Wherry (Robert J., Jr.), Chalfont, Pa.
CREWSTATION DESIGN AND VALIDATION c54
Robert J. Wherry, Jr. *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 203-228 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

The central problem in crewstation design, that of optimizing the exchange of information between the human and machine components of a system is addressed. The CAR, CUBITS, GROUP, ABBREV, VRAS, and HOS programs, products of the Navy's Human Factors Engineering Technology Development program are all discussed. They are representative to the type of technology which was previously indicated as necessary to move crewstation design and validation to a higher lever of maturity, one which takes cognizance of the multivariate nature of the problems faced by the crewstation designer and has a far less dependence of the whims of personal or subjective opinion. B.W.

N85-14823*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OPERATIONAL REQUIREMENTS - SYSTEM CONCEPTS c05
J. W. Voorhees and H. L. Snyder *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 229-238 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

Nine research areas that are most critical to the issue of cockpits for the single pilot are discussed. Helicopter are addressed in this report. They are as follows: (1) automation priority issues; (2) increased complexity of systems; (3) cockpit workload highest in navigation; (4) auto hover and flight trim controls; (5) voice technology in integrated form; (6) systems must have visual and auditory declutter modes; (7) cockpit should be designed to be NBC resistant; and (8) considerations for spillover to civilian public service. B.W.

N85-14824*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AVIONICS TECHNOLOGY - SYSTEM CONCEPTS c54
J. S. Bull and R. B. Huntoon *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 239-246 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

Avionics System Concepts to meet technology needs of advanced helicopter integrated cockpit design are identified. Specific avionics system concepts which should be conducted and/or support by NASA to most effectively aid industry in advanced helicopter integrated cockpit design are also identified. Candidate Missions and Mission Requirements to meet technology needs are considered. B.W.

N85-14825*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MAN-MACHINE INTERFACE REQUIREMENTS - ADVANCED TECHNOLOGY c54
R. W. Remington and E. L. Wiener *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 247-266 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

Research issues and areas are identified where increased understanding of the human operator and the interaction between the operator and the avionics could lead to improvements in the performance of current and proposed helicopters. Both current and advanced helicopter systems and avionics are considered. Areas critical to man-machine interface requirements include: (1) artificial intelligence; (2) visual displays; (3) voice technology; (4) cockpit integration; and (5) pilot work loads and performance. B.W.

N85-14826*# Textron Bell Helicopter, Fort Worth, Tex.
ATTACK HELICOPTER (AH-1T) COCKPIT SYSTEMS INTEGRATION c05
Virgil A. Graf *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 271-316 ref (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

This discussion summarizes the effort conducted by the BHTI Human Factors and Cockpit Arrangement group for a study and design of the integration of a cockpit control system for the AH 1T (TOW). The resulting design is a culmination of studies that were conducted using the existing configuration as a baseline and complementing it with new equipment and subsystems that fulfill the attack helicopter requirements for the foreseeable future. Of primary concern was the requirement to add a missile control system, with secondary considerations for improved NOE and night operations. In addition, growth capabilities for improved target acquisition, weapons delivery, and precise navigation was considered. Along with the addition of new equipment, the aircraft was assumed to have a central multiplex data bus system for information transfer throughout the aircraft and its subsystems. B.W.

N85-14827*# Sikorsky Aircraft, Stratford, Conn.
AVIONICS SYSTEM DESIGN FOR REQUIREMENTS FOR THE UNITED STATES COAST GUARD HH-65A DOLPHIN
David A. Young *In* NASA. Ames Research Center Technical Workshop: Advan. Helicopter Cockpit Design Concepts Dec. 1984 p 285-293 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

Aerospatiale Helicopter Corporation (AHC) was awarded a contract by the United States Coast Guard for a new Short Range Recovery (SRR) Helicopter on 14 June 1979. The award was based upon an overall evaluation of performance, cost, and technical suitability. In this last respect, the SRR helicopter was required to meet a wide variety of mission needs for which the integrated avionics system has a high importance. This paper illustrates the rationale for the avionics system requirements, the system architecture, its capabilities and reliability and its adaptability to a wide variety of military and commercial purposes. Author

N85-14828*# Huntington Beach Police Dept., Calif.
THE NEED FOR A DEDICATED PUBLIC SERVICE HELICOPTER DESIGN
Robert Morrison (Airborne Law Enforcement Association, Inc.) *In* NASA. Ames Research Center Technical Workshop: Advan. Helicopter Cockpit Design Concepts Dec. 1984 p 295-315 ref (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

The need to provide the necessary funding to research, design and contract the building of an advanced technology rotorcraft that will meet the mission demands of public service (fire, police, paramedics and rescue) operators is discussed. Noise and cost factors, the greatest objections on the part of many police and public adminstrators are addressed. The growth of helicopter utilization in public service is documented. B.W.

N85-14829*# Federal Aviation Administration, Fort Worth, Tex.
CERTIFICATION OF ADVANCED SYSTEMS c06
John D. Swihart, Jr. *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 325-349 refs (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

Advanced cockpit systems in helicopters are evaluated in terms of safety certification areas of concern include: (1) power supply system, failure analysis; (2) software control; (3) lightning substantiation; and (4) adequacy of certification regulations. B.W.

N85-14830# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
CRITICAL CONDITIONS FOR THE AUTOMATIC CONTROL OF LANDING FROM DECISION HEIGHT IN VARIABLE WINDS
Sergio Guimaraes Cavalcanti Oct. 1984 299 p refs
(UTIAS-284; ISSN-0082-5255) Avail: NTIS HC A13/MF A01

The critical conditions at decision height that could cause unsafe landing situations were investigated. The analysis of these conditions was performed using a method of automatic control which employs the reference state vector and the reference control vector. A landing tunnel approach was developed using airspeed and altitude as the basic variables with corrections for sink rate and allowance for the presence of wind shear. The landing tunnel concept consists of a landing window that varies with altitude allowing for the possibility of a go-around decision at any moment during the landing maneuver. A procedure for performing the go-around maneuver using a safe minimum height or, if necessary, maximum aircraft capability, was developed which always allows the maximum possible clearance of the ground. An outline of an autoland system incorporating the procedure developed is presented based on an on-board microprocessor to produce the necessary computations. B.W.

N85-14831# Transportation Systems Center, Cambridge, Mass.
NAVSTAR GPS (GLOBAL POSITIONING SYSTEM) MARINE RECEIVER PERFORMANCE ANALYSIS Final Report, Aug. 1982 - Dec. 1983
J. C. Preisig Sep. 1984 62 p
(AD-A146414; DOT-TSC-CG-83-6; USCG-D-25-84) Avail: NTIS HC A04/MF A01 CSCL 17/7

This report is an analysis and comparison of the capability of several NAVSTAR GPS receiver configurations to provide accurate position data to the civil marine user. The NAVSTAR GPS system itself has the potential to provide civil marine users with a position fixing capability having an accuracy, coverage, and availability previously unattainable from any single system. This study utilizes theoretical design formulas and a Monte Carlo type navigation processor simulation program, and discusses various performance tradeoffs. Author (GRA)

N85-14832# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
INTEGRATED NAVIGATION SYSTEMS: WHERE ARE WE HEADED? Final Report
J. L. Hammer, III. 27 Aug. 1984 21 p

(AD-A146425) Avail: NTIS HC A02/MF A01 CSCL 17/7

The relentless penetration of technology and the explosion of information collecting and processing systems is rapidly becoming a challenge to users of modern navigation techniques. The most positive outlook is that development of new and improved integrated and synergistic navigation systems will result to take advantage of the common objective of all navigation systems - accurate and quick determination of ship position. This paper traces briefly the rapid growth of technology and the information revolution. Navigation in the past - and even now - has involved paper charts, coupled with celestial and visual methods. Currently, we are experiencing growing capabilities to figure navigation problems quickly using hand-held calculators, portable computers, and to position ourselves worldwide with such systems as Omega and the Global Positioning System. To cope with excessive information overload, there is a need to integrate into a simple system changing status of events affecting ship operations using such diverse data elements as weather, fuel consumption rate, ship position and track, display of essential chart features, and Notice to Mariners changes. The integrated navigation system, a subsystem in a comprehensive ship control system, will have to be capable of allowing the mariner to selectively handle the data mass available. The objective of the paper is to stimulate discussion in actual and conceptual approaches to integrated navigation systems.

Author (GRA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N85-14833*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

FLIGHT TEST TECHNIQUE FOR EVALUATION OF GUST LOAD ALLEVIATION ANALYSIS METHODOLOGY

Boyd Perry, III Dec. 1984 22 p refs Presented at the Aeroservoelasticity Tech. Spec. Meeting, Wright-Patterson AFB, Ohio, 2 Oct. - 4 Oct. 1984

(NASA-TM-86344; NAS 1.15:86344) Avail: NTIS HC A02/MF A01 CSCL 01C

A technique for gust load alleviation (GLA) flight testing that will approximate a turbulence-like excitation of the wing has been devised. An artificial excitation is produced by randomly deflecting inboard control surfaces on the wing, thereby producing incremental loads on the wing. This presentation covers the background and development of the flight test technique and analyses performed to date. B.W.

N85-14834# National Aerospace Lab., Tokyo (Japan).

A THEORETICAL DESIGN METHOD FOR 3-DIMENSIONAL TRANSONIC WINGS

Susumu Takanashi Aug. 1984 16 p refs In JAPANESE; ENGLISH summary

(NAL-TR-830; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

A general design method for three-dimensional transonic wings with prescribed pressure distribution is presented. The present approach is based on an iterative residual-correction concept. The residual, defined as the difference between the computed and the prescribed pressure distributions at each iteration step, is determined by the use of an existing direct analysis code for a three-dimensional transonic wing, and the wing surface geometry correction to compensate for the residual can be approximately obtained from the inverse design code developed in the present study. The inverse problem is solved here by the aid of the transonic integral equation method. The most important feature of the present method is that the analysis code is retained in its original form and can be treated solely as a black box. Some of the design results are also presented for a transonic swept wing. B.W.

N85-14835# National Aerospace Lab., Tokyo (Japan).

FLIGHT TEST RESULTS ON STALL CHARACTERISTICS OF A LARGE JET TRANSPORT

Yukichi Tsukano, Takatsugu Ono, and Jiro Koo Jun. 1984 19 p refs In JAPANESE; ENGLISH summary

(NAL-TR-817; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Flight tests were conducted with a large jet transport airplane to evaluate two techniques for demonstrating the stalling speed: (1) the FAR (Federal Aviation Regulations) demonstration technique; and (2) the flight path 1-G-break technique. Flow separation patterns were observed by tuft servey along the upper surface of the wing during the stall which is defined by each demonstration technique. Based upon the observed flow patterns, the under-lying difference between these techniques were compared and discussed. Author

N85-14836*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CLOSING THE DESIGN LOOP ON HIMAT (HIGHLY MANEUVERABLE AIRCRAFT TECHNOLOGY)

Terrill W. Putnam and M. R. Robinson (Rockwell International) Dec. 1984 11 p refs Presented at the 14th Congr. of the International Council of the Aeronautical Sciences, Toulouse, 9-14 Sep. 1984

(NASA-TM-85923; NAS 1.15:85923; NA-84-1893) Avail: NTIS HC A02/MF A01 CSCL 01C

The design methodology used in the HiMAT program and the wind tunnel development activities are discussed. Selected results from the flight test program are presented and the strengths and weaknesses of testing advanced technology vehicles using the RPV concept is examined. The role of simulation on the development of digital flight control systems and in RPV's in particular is emphasized. E.A.K.

N85-14837*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.

INTEGRATED APPLICATION OF ACTIVE CONTROLS (IAAC) TECHNOLOGY TO AN ADVANCED SUBSONIC TRANSPORT PROJECT. ACT/CONTROL/GUIDANCE SYSTEM STUDY, VOLUME 1 Final Contractor Report, Dec. 1980 - Jan. 1982

Dec. 1982 193 p refs 2 Vol.

(Contract NAS1-15325)

(NASA-CR-165963-Vol-1; NAS 1.26:165963-Vol-1;

D6-51144-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 01C

The active control technology (ACT) control/guidance system task of the integrated application of active controls (IAAC) technology project within the NASA energy efficient transport program was documented. The air traffic environment of navigation and air traffic control systems and procedures were extrapolated. An approach to listing flight functions which will be performed by systems and crew of an ACT configured airplane of the 1990s, and a determination of function criticalities to safety of flight, are the basis of candidate integrated ACT/Control/Guidance System architecture. The system mechanizes five active control functions: pitch augmented stability, angle of attack limiting, lateral/directional augmented stability, gust load alleviation, and maneuver load control. The scope and requirements of a program for simulating the integrated ACT avionics and flight deck system, with pilot in the loop, are defined, system and crew interface elements are simulated, and mechanization is recommended. Relationships between system design and crew roles and procedures are evaluated. E.A.K.

N85-14838*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.

INTEGRATED APPLICATION OF ACTIVE CONTROLS (IAAC) TECHNOLOGY TO AN ADVANCED SUBSONIC TRANSPORT PROJECT. ACT/CONTROL/GUIDANCE SYSTEM STUDY. VOLUME 2: APPENDICES Final Contractor Report, Dec. 1980 - Jan. 1982

Dec. 1982 251 p 2 Vol.

(Contract NAS1-15325)

(NASA-CR-165963-Vol-2; NAS 1.26:165963-Vol-2;

D6-51144-Vol-2) Avail: NTIS HC A12/MF A01 CSCL 01C

The integrated application of active controls (IAAC) technology to an advanced subsonic transport is reported. Supplementary technical data on the following topics are included: (1) 1990's avionics technology assessment; (2) function criticality assessment; (3) flight deck system for total control and functional features list; (4) criticality and reliability assessment of units; (5) crew procedural function task analysis; and (6) recommendations for simulation mechanization. E.A.K.

N85-14816*# Sperry Rand Corp., Blue Bell, Pa.
INTEGRATED COCKPIT DESIGN FOR THE ARMY HELICOPTER IMPROVEMENT PROGRAM
T. Drennen and B. Bowen (Textron Bell Helicopter, Fort Worth, Tex.) *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 121-144 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

N85-14817*# International Business Machines Corp., Owego, N.Y.
HH-60D NIGHT HAWK HELICOPTER
C. S. Richardson *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 145-164 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

N85-14823*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OPERATIONAL REQUIREMENTS - SYSTEM CONCEPTS
J. W. Voorhees and H. L. Snyder *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 229-238 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

N85-14826*# Textron Bell Helicopter, Fort Worth, Tex.
ATTACK HELICOPTER (AH-1T) COCKPIT SYSTEMS INTEGRATION
Virgil A. Graf *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 271-316 ref (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01C

N85-14955# Joint Publications Research Service, Arlington, Va.
ITERATIVE METHOD OF CALCULATING STRENGTH OF AIRFRAME MEMBERS USING FINITE ELEMENT METHOD Abstract Only
S. M. Bastrakov, Yu. A. Denisov, and Yu. G. Popov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 9-14 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14956# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF PARAMETERS OF CUPPED AIRCRAFT LANDING SKI Abstract Only
A. K. Churusov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviat. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 9-14 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14957# Joint Publications Research Service, Arlington, Va.
ANALYTICAL CONSTRUCTION OF FLIGHT VEHICLE SURFACES Abstract Only
V. F. Snigirev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 100-102 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14983# Joint Publications Research Service, Arlington, Va.
STRENGTH ANALYSIS OF FAN-SHAPED WING CONSIDERING TEMPERATURE DEFORMATION AND CREEP DEFORMATIONS Abstract Only
Yu. A. Kashfraziyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 45 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 85-88 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14985# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF THIN-WALLED AIRFRAME MEMBERS IN GEOMETRICALLY NONLINEAR STATEMENT Abstract Only
V. A. Pavlov and A. S. Safonov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 46 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 52-56 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N85-14839# Department of the Air Force, Washington, D.C.
DIRECT VIEW HELMET MOUNTED TELESCOPE Patent Application
T. R. Connon, inventor (to Air Force) Filed 25 Jul. 1984 8 p (AD-D011291; US-Patent-Appl-SN-634247) Avail: NTIS HC A02/MF A01 CSCL 17/8

An improved helmet is provided including an optical system whereby the wearer may telescopically acquire an image of a field of view, which comprises a telescope retractably mounted to the helmet by means of a two-part hinged boom, one end of which is pivotally attached to the side of the helmet, and the other end of which supports the telescope via a rotatable and adjustable mounting whereby the telescope may be conveniently moved from a stored position beside the helment to an operative position in front of the wearer's eye, and aligned and focused in the operative position. Author (GRA)

N85-14814*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SOME THOUGHTS ON THE IMPLEMENTATION OF PILOT NIGHT VISION DEVICES FOR HELICOPTERS
George E. Tucker *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 95-104 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

N85-14815*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HH-65A DOLPHIN DIGITAL INTEGRATED AVIONICS
R. B. Huntoon *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 107-120 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

N85-14818*# Naval Air Development Center, Warminster, Pa.
AVIONICS/CREW STATION INTEGRATION
William G. Mulley *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 165-172 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

N85-14829*# Federal Aviation Administration, Fort Worth, Tex.
CERTIFICATION OF ADVANCED SYSTEMS
John D. Swihart, Jr. *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 325-349 refs (For primary document see N85-14806

06-04)
Avail: NTIS HC A15/MF A01 CSCL 01D

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N85-14840*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REDUCING NUMERICAL DIFFUSION FOR INCOMPRESSIBLE FLOW CALCULATIONS
R. W. Claus, G. M. Neely, and S. A. Syed (United Technologies, East Hartford, Conn.) 1984 20 p refs Presented at the Western States Meeting of the Combustion Inst., Boulder, Colo., 2-3 Apr. 1984
(NASA-TM-83621; E-2055; NAS 1.15:83621) Avail: NTIS HC A02/MF A01 CSCL 21E

A number of approaches for improving the accuracy of incompressible, steady-state flow calculations are examined. Two improved differencing schemes, Quadratic Upstream Interpolation for Convective Kinematics (QUICK) and Skew-Upwind Differencing (SUD), are applied to the convective terms in the Navier-Stokes equations and compared with results obtained using hybrid differencing. In a number of test calculations, it is illustrated that no single scheme exhibits superior performance for all flow situations. However, both SUD and QUICK are shown to be generally more accurate than hybrid differencing. Author

N85-14962# Joint Publications Research Service, Arlington, Va.
DEVICE FOR MEASURING RELATIVE AXIAL EXPANSION OF TURBINE ROTOR EMPLOYING SPACE-VECTOR TRACKING METHOD Abstract Only
V. M. Kapinos, V. A. Kusenko, L. A. Zarubin, Yu. I. Zimichev, V. G. Zyuzkin, F. Ya. Lyakhov, V. Z. Paley, M. D. Tkachenko, V. D. Fesenko, and Yu. L. Khrestovoy *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 27 Transl. into ENGLISH from Elektr. Stantsii (Moscow), no. 3, Mar. 1984 p 27-29 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14963# Joint Publications Research Service, Arlington, Va.
USE OF LEAST-SQUARES METHOD FOR ESTIMATING ERRORS OF TURBINE BLADE TYPE PARTS DURING FABRICATION Abstract Only
O. D. Khlopotov, I. S. Bochkov, Ye. S. Skorodumova, and L. M. Trifonov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 27 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 102-104 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14964# Joint Publications Research Service, Arlington, Va.
PREDICTING CHANGES IN RELIABILITY CHARACTERISTICS OF GAS TURBINE ENGINES DURING OPERATION Abstract Only
V. P. Cheprasov and Ye. Ts. Vulikh *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 28 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 68-72 Previously announced in IAA as A84-30420 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14965# Joint Publications Research Service, Arlington, Va.
OPTIMUM THERMOGASDYNAMIC DESIGN OF GAS TURBINE ENGINES BY CHARACTERISTICS OF ELEMENT PROTOTYPES Abstract Only
Yu. V. Kozhevnikov, V. O. Borovik, V. S. Ivanov, V. A. Talyzin, I. N. Agliullin, and Yu. V. Meluzov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 28 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14966# Joint Publications Research Service, Arlington, Va.
LONGEVITY OF THIN-WALLED ENGINE PARTS SUBJECTED TO TRANSIENT STRESSES UNDER CREEP CONDITIONS Abstract Only
A. F. Gurov, V. D. Tokarev, and V. A. Komkov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 28 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 31-35 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14967# Joint Publications Research Service, Arlington, Va.
RANDOM VIBRATIONS OF AIRCRAFT ENGINE BLADES Abstract Only
A. D. Gershgorin and M. L. Kempner *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 29 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 1, Jan. 1984 p 65-67 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N85-14841*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION EVALUATION OF TWO VTOL CONTROL/DISPLAY SYSTEMS IN IMC APPROACH AND SHIPBOARD LANDING
Vernon K. Merrick Dec. 1984 76 p refs
(NASA-TM-85996; A-9838; NAS 1.15:85996) Avail: NTIS HC A05/MF A01 CSCL 01C

Two control/display systems, which differed in overall complexity but were both designed for VTOL flight operations to and from small ships in instrument meteorological conditions (IMC), were tested using the Ames Flight Simulator for Advanced Aircraft (FSAA). Both systems have attitude command in transition and horizontal-velocity command in hover; the more complex system also has longitudinal-acceleration and flightpath-angle command in transition, and vertical-velocity command in hover. The most important overall distinction between the two systems for the viewpoint of implementation is that in one - the more complex - engine power and nozzle position are operated indirectly through flight controllers, whereas in the other they are operated directly by the pilot. Simulated landings were made on a moving model of a DD 963 Spruance-class destroyer. Acceptable transitions can be performed in turbulence of 3 m/sec rms using either system. Acceptable landings up to sea state 6 can be performed using the more complex system, and up to sea state 5 using the other system. Author

N85-14842# National Aerospace Lab., Tokyo (Japan).
EXPERIMENTAL STUDY ON TRANSONIC FLUTTER CHARACTERISTICS OF SWEPTBACK WING WITH CORE COMPOSITE PLATES HAVING DIFFERENT FIBER ORIENTATIONS
K. Isogai, H. Ejiri, T. Kikuchi, J. Nakamichi, Y. Noguchi, and T. Morita Aug. 1984 12 p refs In JAPANESE; ENGLISH summary
(NAL-TR-827; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The effects of the fiber orientation on the transonic flutter characteristics of a sweptback wing with a core composite plate are examined experimentally. For this purpose, the two kinds of flutter model having the same planform but different bend-twist

characteristics were made; one has a wash-out tendency and the other a wash-in tendency. The wing has an aspect ratio of 5.0, a taper ratio of 0.50 and a leading edge sweep angle of 45 degrees. The airfoil section of this wing is a symmetrical NACA64A010. The flutter models were tested in the National Aerospace Laboratory's 0.6 m x 0.6 m blowdown wind tunnel. The flutter boundaries of both the wash-in and wash-out models were determined for a wide range of the transonic Mach numbers. This experiment revealed that the wash-in model shows approx. 25 to 30 percent higher flutter velocities than those of the wash-out model over the entire Mach number range tested. B.W.

N85-14843# National Aerospace Lab., Tokyo (Japan).
IMPROVEMENT OF THE TRANSIENT RESPONSE IN THE FINITE SETTLING TIME CONTROL
Shuichi Sasa and Akira Watanabe Jul. 1984 17 p refs In JAPANESE; ENGLISH summary
(NAL-TR-823; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

In the finite settling-time control or dead-beat control, there are some systems that do not have good transient response. The optimal control theory is applied to the dead-beat control of a single input/single output system to improve the transient response. Two solutions are derived; one is an open-loop solution, and the other is a state feedback solution. The state feedback solution is obtained by the application of the principle of optimality, and the feedback gains are partly time dependent. The characteristics of the optimal response are shown. Also the effect of the system parameter deviation from the original system and the effect of the state distubance are examined, and it is found that this control low is robust in both cases. This method is applied to a higher order system, that is a Yaw-Damper of an aircraft. The Yaw-Damper is a control system that damps the yawing motion of an airplane. The response of the actual Yaw-Deper and the response of the Yaw-Damper designed by the method mentioned in this paper are compared. It is verified that the latter is almost the same as the former in transient response and that it has the additional feature of finite time settling. B.W.

N85-14844*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
ANALYTICAL REDUNDANCY MANAGEMENT MECHANIZATION AND FLIGHT DATA ANALYSIS FOR THE F-8 DIGITAL FLY-BY-WIRE AIRCRAFT FLIGHT CONTROL SENSORS Final Contractor Report, Jul. 1978 - Sep. 1981
James C. Deckert Apr. 1983 61 p refs
(Contract NAS4-2675)
(NASA-CR-170396; NAS 1.26:170396; CSDL-R-1520) Avail: NTIS HC A04/MF A01 CSCL 01C

The details are presented of an onboard digital computer algorithm designed to reliably detect and isolate the first failure in a duplex set of flight control sensors aboard the NASA F-8 digital fly-by-wire aircraft. The algorithm's successful flight test program is summarized, and specific examples are presented of algorithm behavior in response to software-induced signal faults, both with and without aircraft parameter modeling errors. Author

N85-14968# Joint Publications Research Service, Arlington, Va.
TERMINAL CONTROL OF GLIDING IN ATMOSPHERE Abstract Only
V. A. Afanasyev and T. K. Sirazetnivov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 30 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 5, Oct.-Dec. 1983 p 3-9 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N85-14845# National Aerospace Lab., Tokyo (Japan).
HIGH PRESSURE COMBUSTION TEST FACILITY FOR GAS TURBINE RESEARCH
T. Tamaru, K. Shimodaira, S. Horiuchi, T. Saito, and S. Hayashi 1984 27 p refs In JAPANESE; ENGLISH summary
(NAL-TR-801; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A new high pressure combustion test facility was constructed in the National Aerospace Laboratory, Tokyo, to assist the national project for developing a high efficiency combined cycle gas turbine. It enables continuous combustion tests by an air mass flow of 4 kg/s at a pressure of 5.53 MPa and a temperature of 736 K in the design condition. Two kinds of fuel, i.e., natural gas and kerosene, are available for tests at a maximum supply pressure of 10 MPa. In this paper, details of the planning of the facility and the structure are described. In designing the building, special care was taken to prevent anticipated noise pollution of the surrounding area. Test runs, made early in the spring of 1983, proved successful. Author

N85-14846# Kinton, Inc., Alexandria, Va.
SITUATIONAL INTERACTIVE MICRO/GRAPHIC SIMULATOR SYSTEM FOR IMPROVING MAINTENANCE PERFORMANCE Final Technical Paper, Jan. 1980 - Jan. 1983
E. L. Shriver and R. C. Trexler Brooks AFB, Tex. AFHRL Sep. 1984 144 p
(Contract F33615-80-C-0012)
(AD-A146677; AFHRL-TP-84-9) Avail: NTIS HC A07/MF A01 CSCL 05/9

A generic hardware trainer tester was constructed using a microcomputer, two image storage/display devices, a magnetic and reader, a data entry keypad, and a printer. Problem-solving courseware was developed based on situational interaction techniques. Thirty problems simulated troubleshooting the major components of the FB-111A flight simulator. Students solved each problem by forming their hypotheses about the source of trouble, abstracting data from the displays/test instruments they chose to observe, and reformulating their hypotheses as needed. They completed the problem-solving process by replacing the malfunctioning part and verifying that this replacement cleared all symptoms. Some problems were multiple malfunctions. Fifteen newly assigned personnel had to find and correct malfunctions placed in the actual equipment, given only the AFTO Form 781 work order which stated a symptom of the problem. The six personnel with trainer tester experience solved all problems. The nine personnel without the simulator experience solved about half the problems. The simulator-experienced personnel solved the problems in half the time the others did. More than half the simulator-experienced personnel were consistent in taking steps that led directly to problem solution. None of the personnel who lacked simulator experience were consistent; all took irrelevant steps. Job supervisors look for consistent performance before trusting performers in order to avoid damage to themselves or the equipment. In effect, the simulator training reduces the time it takes new personnel to become consistent job performers. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

No abstracts in this category.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N85-14847# National Aerospace Lab., Tokyo (Japan).
THEORY OF THE ORBITAL MOTION OF AN ARTIFICIAL EARTH SATELLITE
Sumio Takeuchi 1984 55 p refs In JAPANESE; ENGLISH summary
(NAL-TR-807; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

Considering dominant perturbative influences and coupling effects among them, a unified theory of the orbital motion of an artificial Earth satellite is developed. The theory includes very realistic and complex perturbation models and provides analytically a relatively accurate visualization of the effects of the various perturbations. As the dominating perturbative influences the Earth's gravitational perturbations, the luni-solar perturbations, the solar radiation pressure perturbation, the atmospheric drag perturbation, and small perturbing forces provided by the thrusts of propulsion systems are taken into account. As the reference system an intermediate, quasi-inertial reference frame is adopted. Using the general perturbation method, the complete set of Lagrange's equations for variations of the orbital elements is applied. The equations are expressed by means of the usual form and the Gaussian form. Further, the equations are modified to include the effects of motion of the reference system. Disturbing functions, perturbing accelerations, and angular elements referred to the adopted system are expressed analytically. On referring to the expressions of disturbing functions, perturbing accelerations, and angular elements referred to the adopted system, the time rates of change of the orbital elements are derived by use of the equations of motion. B.W.

N85-14848# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ORBITAL MANEUVERS WITH FINITE THRUST. VOLUME 1: MATHEMATICAL FORMULATION, NUMERICAL METHODS, CATALOG CONCEPT
H. Klotz, J. Weiss, and I. Widjaja Paris ESA May 1983 187 p refs 5 Vol.
(Contract ESTEC-4890/81/NL-PP(SC))
(ESA-CR(P)-1910-Vol-1) Avail: NTIS HC A09/MF A01

A reference catalog from which quantitative information about orbital maneuvers with finite thrust can be extracted was produced. The catalog enables engineers to predict the propellant consumption for a given orbital maneuver with finite thrust, to select the proper propulsion system, and to trade off the different thrust policies required to achieve given final orbit conditions. The catalog contains velocity increment losses and apsidal radius change and the line of apsides drift. A software package to calculate a single transfer maneuver as well as a manifold of transfer cases condensed into catalog charts was developed.
Author (ESA)

N85-14849# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ORBIT MANEUVERS WITH FINITE THRUST. VOLUME 2: REFERENCE MANUAL, PART 1
J. Weiss Paris ESA Jan. 1984 164 p refs 5 Vol.
(Contract ESTEC-4890/81/NL-PP(SC))
(ESA-CR(P)-1910-Vol-2-Pt-1) Avail: NTIS HC A08/MF A01

The delta - requirements of an impulsive transfer between two Kepler orbits was compared with that of an optimal transfer applying finite thrust. The mathematical formulation and method of solution are explained. Also included are the explanations of the computer programs and subroutines. B.G.

N85-14850# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ORBIT MANEUVERS WITH FINITE THRUST. VOLUME 3: USER'S GUIDE, PART 2
J. W. Cornelisse (ESTEC, Noorwidjk, Netherlands) Paris ESA Jan. 1984 97 p 5 Vol.
(Contract ESTEC-4890/81/NL-PP(SC))
(ESA-CR(P)-1910-Vol-3-Pt-2) Avail: NTIS HC A05/MF A01

Several software packages were developed and installed on the ESTEC Honeywell L66. These programs called SOMFIT, COMFIT, SOMPLOT, and COMPLOT, respectively, calculate a single transfer maneuver, a set of transfer maneuvers and generate the corresponding plots. In addition to these four programs which use single precision arithmetic, and second version of SOMFIT, called SOMFITD, using double precision arithmetic was installed on the ESTEC Honeywell. B.G.

N85-14851# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ORBIT MANEUVERS WITH FINITE THRUST. VOLUME 3: REFERENCE CATALOG, PARTS 1 AND 2
J. Weiss, B. Metzger, and M. Gallmeister Paris ESA Jan. 1984 283 p 5 Vol.
(Contract ESTEC-4890/81/NL-PP(SC))
(ESA-CR(P)-1910-Vol-3-Pt-1/2) Avail: NTIS HC A13/MF A01

The following quantities for single are finite thrust orbit transfer are presented: the velocity increment loss (Delta DeltaV), the change of the apsidal radius where the maneuver takes place (Deltar), and the drift of the line of apsides (Delta Omega). Two orbit transfer Cases were selected: Case 1 in which the final orbit is completely specified, i.e., r(sub12)=r(sub11) and Omega(sub2) =Omega(sub1) and Case 3 with Omega-(sub2)=Omega (sub1) and r(sub12) free, or Case 4 with both Omega(sub2) and Omega (sub12) free, depending on the energy of the initial orbit. B.G.

N85-14852# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ORBIT MANEUVERS WITH FINITE THRUST. VOLUME 3: REFERENCE CATALOG, PART 3
J. Weiss, B. Metzger, and M. Gallmeister Paris ESA Jan. 1984 257 p 5 Vol.
(Contract ESTEC-4890/81/NL-PP(SC))
(ESA-CR(P)-1910-Vol-3-Pt-3) Avail: NTIS HC A12/MF A01

Charts of the apsidal radius change Deltar and the line of apsides drift Delta Omega are presented. Charts were generated for discrete values of the parameter bar E(sub1) and K(sub3), the valves of which are presented. B.G.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N85-14853 Department of the Army, Washington, D. C.
FAST RESPONSE IMPULSE GENERATOR Patent
E. R. Caponi, inventor (to Army) Issued 24 Apr. 1984 3 p
(AD-D011283; US-Patent-4,444,119; US-Patent-Appl-SN-394566; US-Patent-Class-102-530) Avail: US Patent and Trademark Office CSCL 19/1

This abstract describes an impulse generator for providing an impulsive force substantially normal to the axis of a missile to provide the missile with the desired angle of attack. The device includes radial explosive paths to its periphery and from each point on the periphery detonation is transferred to the periphery of the main charge causing it to implode. Author (GRA)

N85-14854# National Aerospace Lab., Tokyo (Japan).
VIBRATION ANALYSIS OF A MULTIPURPOSE PLATFORM
Taketoshi Hanawa, Yoshiaki Ohkami, Eiichi Nakai, and Tsuguo Tadakawa 1984 41 p refs In JAPANESE; ENGLISH summary (NAL-TR-803; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

This paper presents results of the vibration analysis for simplified models of a multipurpose geostationary platform. The analysis approach is based on the energy method that has been applied by one of the authors using assumed mode functions for the purpose of analyzing aircraft vibration problems. For the detailed analysis, the finite element method is widely used, but in a preliminary analysis the method described here is also useful since it is computationally tractable and easy to handle although there are constraints on the configuration complexity. The paper consists of two parts. The first part describes a mission model of the proposed platform containing six missions of communication and broadcasting. Launch sequences and deployments of the platform, and mass and inertia properties of the constitutent modules are briefly explained. The second part presents the analysis procedure, together with the simplifying assumptions, and the main results. The analyses are performed not only for the final platform of cross type and T letter configuration, but also for the interim stages of construction. The results are shown in figures with numerical tables. Author

N85-14855# Federal Aviation Administration, Atlantic City, N.J.
WEATHER SATELLITE PRODUCTS IN THE FLIGHT SERVICE AUTOMATION SYSTEM (FSAS) Final Report, Jun. 1980 - Aug. 1981
J. Henline May 1984 69 p
(AD-A146520; DOT/FAA/CT-83/12; DOT/FAA/PM-83/15) Avail: NTIS HC A04/MF A01 CSCL 09/2

The activity discussed in this report was conducted to determine the acceptability and operational effectiveness of various techniques for displaying and distributing Weather Satellite Imagery within an Automated Flight Service Station (AFSS) environment. Primary consideration was given to the effectiveness of the displayed data together with the presentation format used for evaluations and demonstrations. Second, man-machine relationships and some hardware/software aspects were tested and evaluated in both field and laboratory environments. Results from all project activity indicated that the techniques and systems studied provided graphic data in a form suitable for use by preflight, in-flight, and en route flight advisory specialists for nearly all their briefing functions. The concept of electronic displayed data utilizing the test-bed assembled for project activity proved reliable and acceptable (though not optimal) by the specialists participating in the three evaluation phases. Conditional acceptability was found in display medium and size, graphical quality and information presentation, and for the associated software programs for accessing the data through the test-bed installations. Additionally, the animation (i.e., movie looping) was the most desired feature of the test-bed system. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N85-14856 Stanford Univ., Calif.
DISTURBANCE PROPAGATION IN STRUCTURAL NETWORKS; CONTROL OF LARGE SPACE STRUCTURES Ph.D. Thesis
Andreas Hubertus vonFlotow 1984 160 p
Avail: Univ. Microfilms Order No. DA8420632

It is assumed that large space structures may be modelled as networks of slender structural members interconnecting massive bodies. Several types of members are considered. Truss-work members may be modelled by equivalent continuum models or by more exact methods based upon the transfer matrix of a single cell. Members which are treated with continuum models may be uniform or have slow spatial variation. Bodies are modelled as elastic, with a finite number of degrees of freedom. The dynamics of such structures are described in two complementary ways. A method is developed for deriving exact transcendental transfer functions for arbitrary network topology. The network may include any number of members and bodies. The method is tested on examples and is found to be computationally stable. The dynamics of such structures are also investigated in the time domain via travelling wave mathematics. Wave propagation on structural members is described in terms of wave-mode dispersion characteristics and impulse responses. Dissert. Abstr.

N85-14857# National Aerospace Lab., Tokyo (Japan).
ACTIVE NUTATION CONTROL OF SPACECRAFT USING A MAGNETIC BEARING MOMENTUM WHEEL WITH VERNIER GIMBALLING CAPABILITY
Atsushi Nakajima and Chikara Murakami Jul. 1984 24 p refs (NAL-TR-8201; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Active nutation damping using a double gimballed magnetic bearing momentum wheel is a far superior system, with its emphasis on the no stiction torque of the gimbal axes, the inherent adjustable restoring stiffness of the tilting motion and the virtually vernier gimballing capability without any additional mechanism. The nutational motion of the spacecraft is detected by the position sensors of the magnetic bearing servo system with a sufficient

accuracy without using any of the spacecraft attitude sensors. An intensive cross coupling method between the two radial axes to reduce the nutation is proposed and the control system is analyzed in detail. Analytical results and computer simulations show that the nutation damping time constant is shortened by about 1/20 as compared with the gimbal system without cross coupling effect. Author

N85-14858*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CIRCUIT TRANSIENTS DUE TO NEGATIVE BIAS ARCS ON A HIGH-VOLTAGE SOLAR ARRAY IN LOW EARTH ORBIT
Roger N. Metz (Colby Coll., Waterville, Maine) Jan. 1985 12 p refs
(NASA-TP-2407; E-2239; NAS 1.60:2407) Avail: NTIS HC A02/MF A01 CSCL 22B

Arcing to negatively biased, exposed solar cell interconnects on solar arrays placed in plasma environments was established. Arcing, however, may cause damaging interference with the operation of electrical power systems in spacecraft planned to be driven with high-voltage solar arrays. An analytical model was developed to estimate the effects of netagive bias arcs on solar array power system performance. Solar cell characteristics, plasma interactions, and power system features are modeled by a linear, lumped element transient circuit, and the time domain equations are solved. Numerical results for solar array common mode and load voltage transients are calculated for typical conditions. Acceptable load transients are found for a range of arc current amplitudes and time constants. E.A.K.

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N85-14859 Department of the Air Force, Washington, D.C.
COMBINED CYCLE RAMJET ENGINE Patent
J. R. Smith, inventor (to Air Force) Issued 10 Apr. 1984 6 p Supersedes AD-D006306
(AD-D011247; US-Patent-4,441,312; US-Patent-Appl-SN-051315; US-Patent-Class-60-245) Avail: US Patent and Trademark Office CSCL 21/8

The metallic wall of the combustion chamber of a combined rocket-ramjet engine is lined with solid ramjet fuel overlaid with rocket fuel. After the consumption of the rocket fuel in the boost portion of the flight the solid ramjet fuel burns and ablates protecting the metallic combustion chamber wall from high temperatures during the cruise phase of the missile flight. Author (GRA)

N85-14860 Department of the Army, Washington, D. C.
GYRODYNAMIC FIXTURE FOR MEASURING THRUST FORCE COMPONENTS Patent
J. W. Farrell and J. L. Andrews, inventors (to Army) Issued 22 Jul. 1980 6 p
(AD-D011258; US-Patent-4,214,156; US-Patent-Appl-SN-972303; US-Patent-Class-250-231) Avail: US Patent and Trademark Office CSCL 21/8

This abstract describes apparatus for measuring rocket motor thrust components and resolving small vector alignment errors. Apparatus includes a spherical air bearing which embodies gyrodynamic principles in order to provide three degrees of angular freedom and in order to achieve stiff, vibration free reactions against translational movement. Effects of thrust misalignment are seen as changes in angular rate which can be measured by encoding rotations of the floated rocket motor inner bearing assembly by use of built-in sensors and/or by motion with an external optical tracker. Author (GRA)

N85-14861*# National Aeronautics and Space Administration, Washington, D. C.
EXPERIMENTAL RESEARCH ON ELECTRIC PROPULSION. NOTE 7: ANALYSIS OF THE PERFORMANCE OF AN ARC-JET DRIVEN BY MEANS OF HYDROGEN AND NITROGEN
Aurelio C. Robotti and Mario Oggero Jul. 1984 17 p refs Transl. into ENGLISH from La Ricerca Sci., Anno 35, Ser. 2, Rendiconti A (Italy), v. 8, no. 4, 1965 p 894-901 Original language document was announced as A66-22097 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77473; NAS 1.15:77473) Avail: NTIS HC A02/MF A01 CSCL 21C

Experiments which use a new type of arc-jet, characterized by composite electromagnetic and vortex stabilization and propelled by hydrogen and nitrogen in turn are described. The electrical characteristics of the arc and the loss of heat through the electrodes is emphasized. E.A.K.

N85-14862*# CHAM of North America, Inc., Huntsville, Ala.
ANALYSIS OF PHYSICAL-CHEMICAL PROCESSES GOVERNING SSME INTERNAL FLUID FLOWS Progress Report
A. K. Singhal, S. F. Owens, T. Mukerjee, L. W. Keeton, C. Prakash, and A. J. Przekwas Dec. 1984 87 p
(Contract NAS8-35970)
(NASA-CR-174245; NAS 1.26:174245; Rept-4045/10) Avail: NTIS HC A05/MF A01 CSCL 21H

The efforts to adapt CHAM's computational fluid dynamics code, PHOENICS, to the analysis of flow within the high pressure fuel turbopump (HPFTP) aft-platform seal cavity of the SSME are summarized. In particular, the special purpose PHOENICS satellite and ground station specifically formulated for this application are listed and described, and the preliminary results of the first part two-dimensional analyses are presented and discussed. Planned three-dimensional analyses are also briefly outlined. To further understand the mixing and combustion processes in the SSME fuelside preburners, a single oxygen-hydrogen jet element was investigated. R.S.F.

N85-14863# National Aerospace Lab., Tokyo (Japan).
A STUDY ON A MEDIUM-SIZED ROCKET WITH BURNOUT FRAME
Yojiro Mutoh 1984 63 p refs In JAPANESE; ENGLISH summary
(NAL-TR-821; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

This advanced high altitude projectile is a medium sized single stage solid propellent meteorological rocket which ejects a 4 Kg radio sonde with a parachute on altitude of 60 Km to gather wind speed, direction and temperature data on the upper stratosphere and mesosphere. After the mission, the rocketmotor, including fins and nose cone, burn to ash. Therefore there is no danger that any of the system will fall to the Earth and cause damage. The rocket is 140 mm in diameter, 3000 mm long and weighs 70 Kg when provided with a standard sounding sonde. However, the exact length and weight vary with the type of payload, whether metal chaff, silver iodide, etc. There are two basic configurations of this rocket system, one for high altitude meteorology, the other for scattering AgI in weather modification projects. The latter is also used for ejecting chaff in radar location experiments. Author

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N85-14864*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF WATER ON HYDROGEN PERMEABILITY
David D. Hulligan (Sverdrup Technology, Middleburg Heights, Ohio) and William A. Tomazic 1984 14 p refs Presented at the 22nd Automotive Technol. Develop. Contractors' Coordination meeting, Dearborn, Mich., 26 Oct. - 2 Nov. 1984; sponsored by DOE
(Contract DE-AI01-77CS-51040)
(NASA-TM-86904; E-2389; DOE/NASA/51040-59; NAS 1.15:86904) Avail: NTIS HC A02/MF A01 CSCL 07D

Doping of hydrogen with CO or CO2 was developed to reduce hydrogen permeation in Stirling engines by forming low permeability oxide coatings in the heater tubes. An end product of this process is water - which can condense in the cold parts of the engine system. If the water vapor is reduced to a low enough level, the hydrogen can reduce the oxide coating resulting in increased permeability. The equilibrium level of water (oxygen bearing gas) required to avoid reduction of the oxide coating was investigated. Results at 720 C and 13.8 MPa have shown that: (1) pure hydrogen will reduce the coating; (2) 500 ppm CO (500 ppm water equivalent) does not prevent the reduction; and (3) 500 ppm CO2 (1000 ppm water) appears to be close to the equilibrium level. Further tests are planned to define the equilibrium level more precisely and to extend the data to 820 C and 3.4, 6.9, and 13.8 MPa. R.S.F.

N85-14865# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CHEMISTRY
6 Nov. 1984 84 p Transl. into ENGLISH from various Russian articles
(JPRS-UCH-84-012) Avail: NTIS HC A05/MF A01

Various topics in chemistry are discussed, including adsorption, analytical chemistry, biochemistry, catalysis, the chemical industry, coal gasification, combustion, and electrochemistry. In addition, free radicals, inorganic compounds, organometallic compounds, organophosphorus compounds, pesticides, and petroleum processing technology are considered. Attention is also given to gas chromatography, polymers and polymerization, radiation chemistry, and water treatment. For individual titles, see N85-14866 through N85-14877.

N85-14866# Joint Publications Research Service, Arlington, Va.
GAS CHROMATOGRAPHIC DETERMINATION OF CONTENT OF HARMFUL SUBSTANCES IN AIR OF INDUSTRIAL LOCATIONS Abstract Only c25
V. M. Pantayeva, T. I. Baskakova, N. M. Kvasha, and T. A. Krendeleva *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 55 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 47-48 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Conventional chemical-colorimetric methods for analyzing air in industrial locations producing synthetic fibers are difficult, lengthy, require a variety of reagents, and often lack the required selectivity. In the present work a universal gas chromatographic method for determining the majority of organic substances present in air was developed. Low boiling, volatile components are first concentrated by adsorption on a porous polar polymer, while the higher boiling components are concentrated in a small quantity of solvent in a porous plate absorber. Analysis is carried out by chromatographic separation in a single column filled with 20% hexakis-(2-cyanethoxy)hexane on Chromosorb W or Chromatone N. The method is rapid, has high sensitivity, does not require toxic reagents and may be carried out in an automatic gas chromatograph. Author

N85-14867# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF POLYCAPROAMIDE FIBERS MODIFIED BY GRAFTED POLYACRYLONITRILE Abstract Only c27
S. E. Shalabi, I. S. Afanasyeva, G. A. Gabriyelyan, and T. V. Druzhinina *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 56 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 32-33 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Grafting of polyacrylonitrile (PAN) on polycaproamide (PCA) fibers results in improvement of their light stability and makes them look more like wool fibers which is an important property in synthetic wool products. The grafting process was studied using PCA fiber with quaternary ammonium groups (QAG) and an activator--K2S2O8; this method gave highly effective grafting results without the formation of a homopolymer. Properties of the modified PCA fibers were studied. The grafting of PAN on PCA resulted in improved characteristics of the product: better light stability, thermal stability, and more natural wool appearance. Author

N85-14868# Joint Publications Research Service, Arlington, Va.
LOW TEMPERATURE SYNTHESIS OF POLYCAPROAMIDE COPOLYMERS GRAFTED WITH POLYDIMETHYLAMINOTHYLMETHACRYLATE Abstract Only c27
A. P. Khardin, V. F. Zheltobryukhov, and M. K. Tatarnikov *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 56 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 33-34 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

The development of a highly effective yet technically simplified synthetic method for grafted polycaproamide (PCA) was investigated. The method was as follows: during the first stage PCA fiber was activated with 0.5 to 2% of aqueous H2O2 in presence of .01 to .0001% CuSO at 50 to 80 C for 30 to 60 min. Then the fiber was washed to remove excess H2O2 and Cu(++) and treated with 20% aqueous solution of dimethylaminothylmethacrylate at 20 to 30 C for 60 to 120 min. Next, the fiber was washed with ethanol for 12 hrs and the homopolymer was precipitated with acetone. This grafting was very effective (about 100%), the reagents are easily accessible and the method is highly recommended for practical application. Author

N85-14869# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF REINFORCED COMPOSITE THREADS BASED ON POLYMER MIXTURES Abstract Only c27
M. V. Tsebrenko *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 57 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, Mays - Jun. 1984 p 35-37 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

A number of factors influencing the reinforcing effect of composite threads as studied: nature of the polymers being mixed, structures of extruded materials, conditions of orientation stretching of the threads, etc. It was shown that reinforcement produced a synergistic effect on the strength and the initial modulus. Evidently, ultrathin polyhydroxymethylene fibers are formed during the melting process in the other polymer. Addition of 10% of polyhydroxymethylene (PHM) to the polycaproamide (PCA) increases the strength of a thread 1.5 fold and the initial modulus 2.28 fold. This effect was observed during the formation of threads from molten mixtures of PCA-PHM, copolyamide-PHM, ethylene copolymerized with vinylacetate (EPVA)-PHM. Polymer mixtures with a well developed interphase layer and strong interaction of its components achieve maximum reinforcement at a low content of the dispersion phase polymer. In absence of a strong interaction, the maximum effect is observed during a preferred formation of a dispersed phase of continuous ultrafine fibers. Author

N85-14870# Joint Publications Research Service, Arlington, Va.
FIRE RETARDANT CELLULOSEHYDRATE FIBERS Abstract Only c27
A. Ya. Ivanova, N. S. Zubkova, M. A. Tyuganova, and L. S. Galbraykh *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov.

1984 p 57 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 37-38 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Fire protective properties were imparted on cellulosehydrate fibers by synthesis of grafted copolymers of cellulose and polymethylvinylpyridine, followed by a treatment with phosphoric acid or by treatment with an aqueous solution of antipyrene T-2-the diamide of methylphosphoric acid. The treatment of cellulosehydrate fibers with antipyrene T-2 in presence of urea appeared to be the preferred route for imparting fire retardant properties. The energy of activation of thermal decomposition of fire-retardant cellulosehydrate fibers obtained from various antipyrenes was calculated. In other studies, it was shown that there exists a relationship between the apparent energy of activation of cellulose thermodestruction and the effectiveness of phosphorus containing antipyrenes. The energy of activation of the thermodestruction is lowered most drastically when hydrated cellulose is treated with the anti-pyrene T-2. This agrees well with the data on the effectiveness of the fire retardant properties of this antipyrene.
Author

N85-14871# Joint Publications Research Service, Arlington, Va.
IMPROVED UNIFORMITY OF VISCOUS TEXTILE FIBERS OBTAINED BY ALTERING DRYING PROCEDURES Abstract Only **c27**
A. D. Kirillov, A. T. Serkov, A. S. Shevchenko, and A. L. Kaller *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 58 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 40-41 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Nonuniform properties of viscous textile threads formed by the centrifugal method are the results of their formation conditions and those of the separation and drying. The thickness of the thread may be diminished by its drying from inside out. In such a case the internal layers of the thread should decrease long with the shrinking. This in turn should decrease the formation of rigid framework. Verification was sought for the above assumptions; the data obtained supported these assumptions. During the drying process longitudinal shrinkage of the thread takes place. When this is done by the usual method, the decreased volume of internal layers lags behind the shrinkage of the external layers leading to the non-uniformity of the thread properties. During the drying process from inside out, longitudinal shrinking and the decrease in thread volume occur concurrently, preventing the formation of a rigid frame.
Author

N85-14872# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF ANTIMICROBIAL CHEMICAL FIBERS AND FIBROUS MATERIALS CONTAINING QUATERNARY AMMONIUM COMPOUNDS AND THEIR UTILIZATION Abstract Only **c27**
V. M. Vaynburg, I. I. Shamolina, and L. A. Volf *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 58 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 42-44 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

One method of obtaining textile materials with antimicrobial properties consists of modification of chemical fibers with surfactants (SA) containing quaternary ammonium salts (QAS). Some of the best known among them are: dimethylalkylbenzylammonium chloride (catamine AB), alkyltrimethylammonium chloride, alkylacyltrimenthylammonium chloride, etc. To bind effectively the catamine AB to fibers and fabrics, precondensates of thermoreactive resins were used along with various dyes. Catamine AB could be introduced after digestion with a precondensate or during the digestive process. After this step the fabrics are thermally treated at 140 to 160 C for 2 to 3 min. These materials showed high biological activity and could be used for impregnating the disposable gauze pads or filtering materials in decontaminating air at the food processing plants, in the production of amino acids, the shoe industry, bookbinding activities, etc.
Author

N85-14873# Joint Publications Research Service, Arlington, Va.
FORMING FLUORINE-CONTAINING THREADS FROM VINYLIDENE FLUORIDE-TETRAFLUOROETHYLENE COPOLYMER BY DRY METHOD Abstract Only **c27**
B. S. Vesayte, A. V. Bezprozvannykh, A. I. Logvinov, L. Ya. Madorskaya, and L. A. Volf *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 59 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 13-14 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Until recently, wet forming was the preferred method for obtaining thread from fluorine-containing polymer solutions owing to the viscous-flow properties of the spinning solutions and the properties of solvents used. Now, however, the advantages of the dry forming method are available by using vinylidene fluoride-tetrafluoroethylene copolymer and for the oriented stretching and subsequent thermofixation. The resulting threads have high strength and exceed all known fluorine-containing threads in resistance to double flexing.
Author

N85-14874# Joint Publications Research Service, Arlington, Va.
STUDY OF EFFECTIVENESS OF FIRE-RESISTANT ACTIVITY OF ANTIPYRENES FOR FIBERS OF AROMATIC POLYAMIDES Abstract Only **c27**
A. Ya. Ivanova, M. A. Tyuganova, L. S. Galbraykh, A. V. Volokhina, and T. S. Sokolova *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 59 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 18-20 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

With the increasing use of new types of aromatic polyamide fibers, the need arose to increase their fire-resistance. Organophosphorus and chlorine-organic fire retardants were employed in the present work to increase the oxygen index of the above fibers. The fire-resistant effect of the modified fibers was found to withstand wet treatment during production if glycazine is added. Little loss in physical and mechanical properties was observed when organophosphorus antipyrenes were added, while significant loss was observed in the case of chlorine-organic retardants, making the former the preferred modifier.
Author

N85-14875# Joint Publications Research Service, Arlington, Va.
POLYMER-CARBON BLACK INTERACTION IN ELECTRICALLY CONDUCTING FIBER-FORMING COMPOSITES Abstract Only **c27**
L. Ya. Konovalova, S. G. Yefimova, N. B. Pokrovskaya, and A. A. Nikitin *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 60 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 23-24 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

In preparing electrically conducting polymer materials such as films and fiber by adding a conducting component to the polymer, it is important to know the interaction between the polymer and the filler, since this determines both the mechanical and electrical properties of the composite. The possibility of evaluating the nature of this interaction from the content of filler in the composite was studied by measuring acetone adsorption and density. Fluoroplast-42V (tetrafluoroethylene-vinylidene fluoride copolymer) filled with 0 to 50% by weight of PM-100 carbon black was chosen because films of this material was used as a coating on threads to form electrically conducting composite fibers which are then used to make anti-static and screening fabric. Adsorption isotherms at 20 deg and densities at 29.5 deg of the samples showed that this method can be used to evaluate polymer-filler interaction in Fluoroplast-42V - carbon black composites.
Author

N85-14876# Joint Publications Research Service, Arlington, Va.
EFFECT OF POLYMER MATRIX ON PROPERTIES OF FIBERS OBTAINED BY CAKING POLYMER DISPERSIONS Abstract Only **c27**
A. L. Koldobskiy, G. S. Dreyzenshtok, Ye. Ya. Sorokin, K. Ye. Perepelkin, and L. V. Slinko *In its* USSR Rept.: Chem.

(JPRS-UCH-84-012) 6 Nov. 1984 p 61 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 29-30 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Fibers may be formed from infusible and insoluble polymers by shaping them from a disperson containing another polymer as thickener, and then eliminating this polymer by pyrolysis. This is the method used to make fibers from dispersions of polytetrafluoroethylene (PTFE) in cellulose. However, the presence of cellulose and its pyrolysis products and the rate of their removal affect the subsequent caking of the PTFE and the orientation and properties of the resulting fiber. The pore size resulting from statistically dense packing of spherical particles with known distribution radii was estimated. Physical and mechanical properties of PTFE fibers are correlated to the ratio of the initial volume of cellulose matrix to pore size as a result of packing dispersed particles of Fluoroplast-4. A marked drop in maximum stretch factor and thread strength is due to excess cellulose which inhibits caking of PTFE particles and increases defects in thread structure. Author

N85-14877# Joint Publications Research Service, Arlington, Va.
PREPARATION OF FIRE-RESISTANT INFUSIBLE POLYCAPROAMIDE FIBER Abstract Only **c27**
A. V. Efros, M. A. Tyuganova, and L. S. Galbraykh *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 61 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 31-32 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

Preparation of fire-resistant polycaproamide textiles by introducing phosphorous compounds to their composition results in lower physical mechanical properties of the fibers. Also, most methods for lowering flammability do not prevent melting of the fiber. A method is described for preparing fire-resistant polycaproamide fibers using a three-component synergistic system of antipyrenes consisting of gradted poly-2-methyl-c-vinylpyridene, a halogen antipyrene and an antimony compound. The effect of the synergistic system of antipyrenes is reinforced by the oxygen index of the fire-resistant polycaproamide fibers and their rate of decomposition. Author

24 COMPOSITE MATERIALS

Includes laminates.

N85-14878*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CREEP OF CHEMICALLY VAPOR DEPOSITED SIC FIBERS
James A. DiCarlo 1984 21 p refs Presented at the 8th Ann. Conf. on Composites and Advan. Ceram. Mater., Cocoa Beach, Fla., 15-18 Jan. 1984; sponsored by American Ceramic Society (NASA-TM-86897; E-2372; NAS 1.15:86897) Avail: NTIS HC A02/MF A01 CSCL 11D

The creep, thermal expansion, and elastic modulus properties for chemically vapor deposited SiC fibers were measured between 1000 and 1500 C. Creep strain was observed to increase logarithmically with time, monotonically with temperature, and linearly with tensile stress up to 600 MPa. The controlling activation energy was 480 + or - 20 kJ/mole. Thermal pretreatments near 1200 and 1450 C were found to significantly reduce fiber creep. These results coupled with creep recovery observations indicate that below 1400 C fiber creep is anelastic with neglible plastic component. This allowed a simple predictive method to be developed for describing fiber total deformation as a function of time, temperature, and stress. Mechanistic analysis of the property data suggests that fiber creep is the result of beta-SiC grain boundary sliding controlled by a small percent of free silicon in the grain boundaries. Author

N85-14879*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FATIGUE BEHAVIOR OF CONTINUOUS FIBER SILICON-CARBIDE-ALUMINUM COMPOSITES
W. S. Johnson and R. R. Wallis (Virginia Polytechnic Inst. and State Univ., Blacksburg) Dec. 1984 31 p refs
(NASA-TM-86332; NAS 1.15:86332) Avail: NTIS HC A03/MF A01 CSCL 11D

Four lay-ups of continuous fiber silicon carbide (SCS2) fiber/aluminum matrix composites were tested to assess fatigue mechanisms including stiffness loss when cycled below their respective fatigue limits. The lay-ups were [0] (sub 8), [0(sub 2)/ + or - 45] (sub 2s), [0/90] (sub 2s),and [0/ + or 45/90] (subs). The data were compared with predictions from the author's previously published shakedown model which predicts fatigue-induced stiffness loss in metal matrix composites. A fifth lay-up, [+ or - 45] (sub 2s), was tested to compare shakedown and fatigue limits. The particular batch of silicon-carbide fibers tested in this program had a somewhat lower modulus (340 GPa) than expected and displayed poor bonding to the aluminum matrix. Good agreement was obtained between the stiffness loss model and the test data. The fatigue damage below the fatigue limit was primarily in the form of matrix cracking. The fatigue limit corresponded to the laminate shakedown for the [+ or - 45] (sub 2s) laminate. Author

N85-14880*# Wyoming Univ., Laramie. Composite Materials Research Group.
INVESTIGATION OF THE RELATIONS BETWEEN RESIN AND ADVANCED COMPOSITE MECHANICAL PROPERTIES. VOLUME 2: APPENDICES Technical Report, May 1982 - May 1983
Richard S. Zimmerman, Donald F. Adams, and David E. Walrath Nov. 1984 195 p refs 2 Vol.
(Grant NAG1-277)
(NASA-CR-172303-Vol-2; NAS 1.26:172303-Vol-2; UWME-DR-301-101-1-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 11D

One untoughened epoxy baseline resin and three toughened epoxy resin systems were evaluated. The Hercules 3502, 2220-1, and 2220-3, and Ciba-Geigy Fibredux 914 resin systems were supplied in the uncured state by NASA-Langley and cast into thin flat specimens and round dogbone specimens. Tensile and torsional shear measurements were performed at three temperatures and two moisture conditions. Coefficients of thermal expansion and moisture expansion were also measured. Extensive scanning electron microscopic examination of fracture surfaces was performed to permit the correlation of observed failure modes with the environmental conditions under which the various specimens were tested. A micromechanics analysis was used to predict the unidirectional composite response under the various test conditions, incorporating the neat resin experimental results as the required input data. The mechanical and physical test results, the scanning electron microscope observations, and the analytical predictions were then correlated. Author

N85-14881# Aeronautical Research Labs., Melbourne (Australia).
ON THE EFFECTS OF DELAMINATION DAMAGE IN FIBRE COMPOSITE LAMINATES
R. Jones, J. Paul, and W. Broughton Jun. 1984 20 p refs
(ARL-Struc-R-403; ARL-Mat-R-116; AR-003-927) Avail: NTIS HC A02/MF A01

The results of a numerical investigation into the effects of delamination and impact damage on the compressive strength of graphite epoxy laminates and bonded metal-to-composite joints are described. For the laminates considered it is shown that as the size of the damage increases a stage is reached after which any further significant increase in the damage results in only a relatively-small decrease in the residual compressive strength. Author

N85-14882*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FABRICATION AND QUALITY ASSURANCE PROCESSES FOR SUPERHYBRID COMPOSITE FAN BLADES
R. F. Lark and C. C. Chamis 1983 15 p refs Presented at the

15th Ann. SAMPE Tech. Conf., Cincinnati, 4-5 Oct. 1983
(NASA-TM-83354; E-1611; NAS 1.15:83354) Avail: NTIS HC A02/MF A01 CSCL 11D

The feasibility of fabricating full-scale fan blades from superhybrid composites (SHC) for use large, commercial gas turbine engines was evaluated. The type of blade construction selected was a metal-spar/SHC-shell configuration, in which the outer shell was adhesively bonded to a short, internal, titanium spar. Various aspects of blade fabrication, inspection, and quality assurance procedures developed in the investigation are described. It is concluded that the SHC concept is feasible for the fabrication of prototype, full-scale, metal-spar/SHC-shell fan blades that have good structural properties and meet dimensional requirements. R.S.F.

N85-14883# National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
CARBON FIBRE REINFORCED ALUMINUM MATRIX COMPOSITES: A CRITICAL REVIEW
M. U. Islam and W. Wallace Jun. 1984 42 p In ENGLISH; FRENCH summary
(AD-A146367; DM-4; NRC-23498) Avail: NTIS HC A03/MF A01 CSCL 11/4

In this report, the state-of-the-art technology on the carbon fiber reinforced aluminum matrix composites is reviewed. The available raw material, various fabrication techniques along with their effects on the properties of the composites produced and the manufacturing problems encountered are described in detail. General trends are outlined and further research and development work on composites containing pitch base carbon fibers in a matrix of high strength aluminum alloy is recommended. Author (GRA)

N85-14884# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
CHARACTERIZATION OF NEWLY DEVELOPED CONDUCTIVE COMPOSITES Final Report
L. J. Buckley, I. Shaffer, and R. Trabocco Mar. 1984 0035 p (F61-542)
(AD-A146652; NADC-84054-60) Avail: NTIS HC A03/MF A01 CSCL 11/4

Conductive composites consisting of various thermoplastics filled with conductive chopped fibers have been studied. The thermoplastics chosen were polyphenylene sulfide (PPS), polyetherimide (PEI), polyamide (Nylon), polycarbonate (PC), and liquid crystalline polyester (LCP). The chopped fibers included graphite (Gr), stainless (SS), aluminum flake (Al Fl), and nickel coated graphite (NiGr). Drop weight impact and tensile properties were determined. Photomicroscopy and scanning electron microscopy were performed on several composites. GRA

N85-14885# Department of the Navy, Washington, D. C.
PROCESS FOR PRODUCING CARBIDE COATINGS Patent Application
I. L. Singer and R. A. Jeffries, inventors (to Navy) Filed 6 Jun. 1984 10 p
(AD-D011295; US-Patent-Appl-SN-617777) Avail: NTIS HC A02/MF A01 CSCL 11/3

It is an object of this invention to provide a process for forming a surface alloy upon a solid alloy substrate. It is another subject of this invention to provide a method for the solid-state gettering of minority solutes in an alloy. It is a further object of this invention to provide an ion implantation process for producing a surface alloy upon a solid alloy substrate. GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N85-14886 British Library Lending Div., Boston Spa (England).
MEASUREMENT OF OXIDE ION CONCENTRATION IN NaCl-ZnCl2 MOLTEN SALT AND SEVERAL APPLICATIONS
Yasuhiko Ito, Hironari Kotohda, Junichi Uchida, and Shiro Yoshizawa Jul. 1984 17 p ref Transl. into ENGLISH from J. of the Chemical Society of Japan (Japan), no. 6, 1982 p 1034-1038
(BLL-AWRE-Trans-74-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The oxide ion concentration in NaCl-ZnCl2 molten salt can be determined by measuring the emf of the following cell: Na(Mo)/beta-alumina/Na(+), O(--) (in melt)/stabilized zirconia/O2(Pt) and the emf of the cell is expressed as: E = 3.33 - 0.060 log [Oh(--)] at 360 C, when air is used as a positive electrode active mass. From this relation and other experimental data, the equilibrium constants of the reactions, H2O = 2Cl(-) = O(--) + 2HCl(K sub 1, 2OH(-) = O(--) + H2O(K sub 2) were determined as follows: K sub 1 = 1.91,x 10 to the minus 7 (atm),K sub 2 = 0.64 (atm), respectively. The minimization of the corrosion of the non-carbon anode may be achieved by the application of the oxide ion concentration measurement. The possibility was confirmed experimentally. R.S.F.

N85-14887 British Library Lending Div., Boston Spa (England).
BEHAVIOUR OF LEAD-SILVER ANODES IN ZINC ELECTRODEPOSITION FROM SULPHURIC ACID BATHS
D. Butinelli and G. DAngelo 10 Sep. 1984 8 p refs Transl. into ENGLISH from Ind. Mineraria (Rome), v. 25, no. 3, 1974 p 118-124
(BLL-MINTEK-TR-1180-(5810.5759)) Avail: British Library Lending Div., Boston Spa, England

The behavior of pure lead anodes and of Pb-0.2 Ag anodes was investigated with respect to the generation of voltage and current, the potentials of the anodes and the nature of the deposits. The variable concentration of manganese, etc. The cathodic potentials were measured to determine if there exists a variation in the behavior of the cathode depending on the composition of the anode. Results indicate that the current efficiency is not greatly affected by the nature of the anode. The values of cathodic potentials in the presence of different anodes have a 30 mV spread. The effect of material on anodic potentials is strong. R.S.F.

N85-14888 Overseas Relations Branch Translation Service, London (England).
ELECTROCHEMICAL BEHAVIOUR OF TICl4 SOLUTIONS IN LOW MELTING POINT ORGANIC MEDIA
N. Kh. Tumanova, N. M. Sarnavskii, L. V. Bogdanovich, V. N. Belddii, and G. N. Novitskaya 9 May 1984 7 p refs Transl. into ENGLISH from Ukr. Khim. Zh. (USSR), v. 49, no. 3, 1983 p 264-267
(BLL-OA-Trans-3174-(6196.3)) Avail: British Library Lending Div., Boston Spa, England

Carbamide, ammonium sulphamate, ammonium formate, and acetamide were used in an effort to examine the electrochemical behavior of TiCl4 and lower the temperature of the process of obtaining titanium coatings from melts. The calculation of the potentiodynamic curves of the reduction of TiCl4 obtained in an argon atmosphere is discussed. The possibilities of obtaining titanium coatings on 08-KP steel was investigated. Microscopy reveals that the brightest and most compact coatings with the finest crystalline structure were obtained from the electrolysis of carbamide melts. X-ray analysis of a coating on the 08-KP steel produced by an equimolar carbamide-acetamide mixture as the solvent revealed a small quantity of metallic titanium and an intermetallic compound with the composition Ti4Fe2O. By carbidizing the coating in a glow discharge in Cl4 at 1300 deg for 15 minutes, a titanium carbide coating was obtained with good bonding to the base. A.R.H.

N85-14889 British Library Lending Div., Boston Spa (England).
ELECTROLYTIC DEPOSITION OF CHROMIUM FROM AQUEOUS CHROMIUM SOLUTIONS CONTAINING FOREIGN ANIONS
D. Reinkowski and C. A. Knorr 10 Sep. 1984 24 p refs Transl. into ENGLISH from Z. fuer Electrochem. (West Germany), v. 58,

no. 9, 1954 p 709-718
(BLL-Mintek-Tr-1170-(5810.5729)) Avail: British Library Lending Div., Boston Spa, Engl.

After a review of earlier results on the electroelytic reduction of chromic acid, tests are described which give a new viewpoint for interpreting the different potential ranges in the current density-potential curve and the transitions between these ranges. In addition to the largely irreducible cathode surface layers which are already known, information is given about reducible intermediate products in the electrode surface, which influence the course of the reduction. The process of metal deposition is also explained on the basis of the experimental results. Author

N85-14890 British Library Lending Div., Boston Spa (England).
A METHOD OF MAKING THE GAS-ELECTRIC REMOVAL OF HIGHLY DISPERSED PARTICLES MORE EFFECTIVE
L. P. Petrova, V. V. Belousov, and V. I. Petrov 3 Dec. 1984 4 p Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chem. Met. (USSR), no. 5, 1984 p 154
(BLL-M-36030-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Removal of dust from gases was studied by experiments in which sub-micron size particles were allowed to settle in a chamber and the speed of settling was measured. Different distances between electrodes, voltages and corona-forming electrode geometries were studied. It is recommended that the results of the experiments can be used in designing electric filters for removing finely dispersed particles from gas.

N85-14891 Department of the Army, Washington, D. C.
FINLET INJECTOR Patent
D. B. Harmon, Jr. and A. W. Foss, inventors (to Army) Issued 2 Sep. 1980 4 p
(AD-D011245; US-Patent-4,220,297; US-Patent-Appl-SN-971459; US-Patent-Class-244-3.21) Avail: US Patent and Trademark Office CSCL 21/2

A finlet injector for external burning fuel injection is provided to obtain a higher performance through a combination of more optimum air-to-fuel ratio and better air/fuel mixing. This is done by capturing (mixing with) a greater quantity of air for a given fuel injection pressure and flow rate. The device is thermally protected and, for most flight regimes, has minimum drag. Author (GRA)

N85-14892*# National Aeronautics and Space Administration, Washington, D. C.
MONONITRATION OF DURENE
S. B. Hanna, E. Hunziker, T. Saito, and H. Zollinger Dec. 1984 19 p refs Transl. into ENGLISH from Helvetica Chim. Acta (Switzerland), v. 52 (6), no. 158, 1969 p 1537-1548 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77774; NAS 1.15:77774) Avail: NTIS HC A02/MF A01 CSCL 07D

Reaction conditions under which the nitration of durene give predominantly, and in high yield, mononitrodurene (I), rather than dinitrodurene were found. The nitrating agent was No2+RF6-. Nitration with nitrosulfuric acid also gave mononitrodurene; however, byproducts such as 2.3.5.6-Me4C6HCH2C6H2Me3-2,4,5, were also formed. The NO2 PF6- gave an intermediate additional compound with durene. The reaction carried out with 3.6-dideuterodurene in D2O shows no isotope effect. E.A.K.

N85-14893# North Carolina Univ., Chapel Hill. Dept. of Physics and Astronomy.
SPACE CHARGE, INTERFACIAL KINETICS, AND ELECTRICAL RESPONSE OF CONDENSED MATTER Final Report, 1 Jul. 1981 - 31 Dec. 1984
J. R. Macdonald 24 Aug. 1984 5 p
(Contract DAAG29-81-K-0144)
(AD-A146364; ARO-17996.12-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

The completed results of the work of this contract appear in the 12 papers of the enclosed publication list. Of particular importance is the work on lattice gas models of the double layer. It is, however, important to note that we are the first group to obtain significant results for systems involving dipoles of finite rather than infinitesimal length. Some of the papers are concerned one way or another with the interpretation of impedance data in dielectric and conductive systems involving liquid or solid state electrolytes. GRA

N85-14894# Texas Univ., Austin. Dept. of Chemistry.
ELECTROCHEMISTRY IN NEAR-CRITICAL AND SUPERCRITICAL FLUIDS. I. AMMONIA
R. M. Crooks, F. F. Fan, and A. J. Bard 18 Jul. 1984 12 p
(Contract N00014-84-K-0428)
(AD-A146429; TR-1) Avail: NTIS HC A02/MF A01 CSCL 07/4

Cyclic voltammetric and chronocoulometric studies of NH3 containing 0.1 - 0.2 M KI at T and P up to 160 c and 272 atm are reported. Electrochemical generation of solvated electrons is possible even under supercritical conditions, but their stability is lower at higher T. Reduction of m-chloronitrobenzene (MCNB) to the radical anion yields essentially Nernstian waves from 55 C to 160 C. GRA

N85-14895# Texas Univ., Austin. Dept. of Chemistry.
A SILICON PHTHALOCYANINE AND A SILICON NAPHTHALOCYANINE: SYNTHESIS, ELECTROCHEMISTRY, AND ELECTROGENERATED CHEMILUMINESCENCE Technical Progress Report, 1 Sep. 1983 - 31 Aug. 1984
B. L. Wheeler, G. Nagasubramanian, A. J. Bard, L. A. Schechtman, and M. E. Kenney 30 Jul. 1984 28 p
(Contract N00014-78-C-0592)
(AD-A146441; TR-32) Avail: NTIS HC A03/MF A01 CSCL 07/3

The synthesis, spectral characterization, and electrochemical behavior of bis(tri-n-hexylsiloxy)-2,3-phthalocyaninatosilicon its dimer, and its naphthalocyanine analog are described. All compounds show near UV absorption corresponding to Soret and N bands and intense absorption in the visible-near IR region corresponding to Q-bands. GRA

N85-14896# National Bureau of Standards, Gaithersburg, Md. Inorganic Materials Div.
PHASE EQUILIBRIA OF STORED CHEMICAL ENERGY REACTANTS Annual Report, 25 May 1983 - 25 May 1984
L. P. Cook, E. R. Plante, R. S. Roth, and J. W. Hastie 25 Jul. 1984 111 p
(Contract N00014-83-F-0117)
(AD-A146527; NBSIR-84-2940) Avail: NTIS HC A06/MF A01 CSCL 07/4

The reaction of lithium aluminum alloy with water at high temperature is considered in terms of phase equilibria in the system Li-Al-O-H. A thermodynamic analysis of the system reveals the potential importance of lithium hydride as a reaction product. Major needs for experimental phase equilibria data are outlined, and a determination of the Li2O-Al2O3 phase diagram is given top priority. Experimental methods for preparation and handling of atmospherically sensitive Li2O/Al2O3 mixtures are given. GRA

N85-14897# State Univ. of New York, Binghamton. Dept. of Chemistry.
VAPORIZATION BEHAVIOR, PHASE EQUILIBRIA, AND THERMODYNAMIC STABILITIES OF NICKEL PHOSPHIDES Interim Technical Report
C. E. Myers and T. J. Conti 4 Oct. 1984 19 p
(Contract N00014-82-K-0501)
(AD-A146683; TR-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

The equilibrium vaporization reactions, 12 Ni2P(s) = 2 Ni12P5(s) loss effusion in the temperature range 1237-1401 K are discussed. The results were combined with published calorimetric data for nickel-rich samples and static phosphorus dissociation pressure data for phosphorus-rich samples, with consideration of the requirements of the published phase diagram, to obtain enthalpies of formation (from red P), Delta H sub f deg, and enthalpies of atomization, Delta H deg at/R, respectively, in

kilokelvins at 298.15 K: 1/4 Ni3P(s), -5.94 + or - 0.5, 54.8; 1/3.55 Ni2.55P(s), -6.65 + or - 0.5, 55.2; 1/17 Ni12P5(s), -6.73 + or - 0.5, 55.1; 1/3 Ni2P(s), -6.87 + or - 0.5, 54.8; 1/9 Ni5P4(s); -6.39 + or - 0.5, 53.0; 1/2.22 Ni1.22P(s). -6.32 + or - 0.5, 52.9; 1/2 NiP(s), -6.09 + or - 0.5, 52.1; 1/3 NiP2(s), -5.38 + or - 0.5, 49.4; 1/4 NiP3(s), -4.52 + or 0.5, 47.6. GRA

N85-14898# Wisconsin Univ., Madison. Dept. of Chemistry.
LUMINESCENT PROPERTIES OF GRADED CADMIUM SULFO-SELENIDE ELECTRODES PREPARED FROM CADMIUM SULFIDE SUBSTRATES
M. K. Carpenter and A. B. Ellis 28 Sep. 1984 32 p
(Contract N00014-78-C-0633)
(AD-A148710; UWIS/DC/TR-84/3) Avail: NTIS HC A03/MF A01 CSCL 07/4

Inhomogeneous samples of n-type CdSxSe1-x (0.2 less than x less than 1) were prepared by vapor-phase diffusion of Se into a single-crystal n-CdS substrate. Characterization of the samples by Auger electron spectroscopy (AES)/Ar ion sputter etching indicates that Se substitutes for S in the lattice to produce a graded region wherein X monotonically increases with depth from approx. 0.2 at the surface to unity over a distance of approx. 1 micrometer. Photoluminescence (PL) and electroluminescence (EL) of these Cd/Se samples are dominated by edge emission characteristic of the near-surface CdSx-Se1-x compositions (approx. 650-700 nm). The narrowness of the spectra compared to spectra reported for CdSe/S graded solids prepared by diffusion of S into n-CdSe is rationalized in terms of the electronic structures of the two compounds. GRA

N85-14899# Oak Ridge National Lab., Tenn. Atomic, Molecular and High Voltage Physics Group.
MULTIPHOTON IONIZATION OF BENZENE IN SOLUTION
K. Siomos, H. Faidas (Tennessee Univ., Knoxville), and L. G. Christophorou (Tennessee Univ., Knoxville) 1984 8 p refs Presented at the 2nd Topical Meeting on Laser Tech. in the Extreme Ultraviolet, Boulder, Colo., 5 Mar. 1984
(Contract DE-AC05-84OR-21400)
(DE85-000893; CONF-840487-10) Avail: NTIS HC A02/MF A01

The multiphoton ionization spectrum of benzene in a dilute solution in n-pentane was measured for laser excitation wavelengths from 360 to 560 nm. The observed spectrum, from 460 to 560 nm, was measured using linearly and circularly polarized light and was ascribed to multiphoton ionization via the two photon resonant (1)B/sub 2(MU)/-(1)A/sub 1g/ transitions of benzene. The order of the multiphoton ionization process was determined, and the observed resonances in the spectral region from 360 to 445 nm are discussed. Power measurements at 337.1 nm indicate that two photons can ionize benezene in this energy region, giving an upper limit to the ionization threshold of benezene in n-pentane of approx. 7.36 eV. DOE

N85-14900# Chicago Univ., Ill. Dept. of the Geophysical Sciences.
NEUTRON DIFFRACTION STUDIES OF THE HYDROGEN BONDING AND WATER MOLECULES IN ZEOLITES
G. Artioli, J. V. Smith, A. Kvick (Brookhaven National Lab.), J. J. Pluth, and K. Stahl (Brookhaven National Lab.) 1984 7 p refs
(Contract DE-AC02-76CH-00016)
(DE84-016431; BNL-35110; CONF-8409135-1) Avail: NTIS HC A02/MF A01

Neutron diffraction was studied at different temperatures for all of the fibrous zeolites, natrolite, scolecite, edingtonite, thomsonite and for several other zeolites with ordered or disordered frameworks (brewsterite, bikitaite, heulandite, yugawaralite). The complexity of the interaction between cations, water molecules and framework atoms is shown. The role of the water molecules is twofold: to complete the coordination of the cations in the cavities and to minimize the electrostatic repulsion between the framework oxygens. The hydrogen atom arrangement seems to be mainly influenced by the ation/hydrogen repulsion. A secondary effect on the hydrogen bonding system is played by the Si, Al distribution in the framework, that is the change distribution around the acceptor oxygen atoms. The charge saturation of the framework oxygen atoms, the distance between pairs of available hydrogen bond acceptors and the flexibility of the water molcules determine the hydrogen bond geometry. The hydrogen bond lengths in zeolites are usually long in comparison with the range found in other crystalline hydrates. DOE

N85-14901# Westinghouse Electric Corp., Pittsburgh, Pa.
HYDROGEN PRODUCTION EMPLOYING HIGH-TEMPERATURE SOLID OXIDE CELLS
N. J. Maskalick, E. S. Buzzelli, D. Zuckerbrod, M. Bonner (Brookhaven National Lab.), A. Mezzina (Brookhaven National Lab.), and F. Salzano (Brookhaven National Lab.) May 1984 7 p refs Presented at the 19th Ann. Intersoc. Energy Conversion Eng. Conf., San Francisco, 19 Aug. 1984
(Contract DE-AC02-76CH-00016)
(DE84-014559; BNL-34837; CONF-840804-29) Avail: NTIS HC A02/MF A01

High-temperature (1000 C) solid-oxide cells were employed to electrolyze water vapor. System energy efficiency of 45%, compared to conventional electrolysis at approx. 30% maximum could be possible. Stable levels of resistance and diffusion polarization were observed after approximately 450 hours of continuous testing. Approximately 100% coulombic efficiency was measured. Water vapor dissocation at a nominal 1 volt at > 300 A/sq. ft. can be expected with heat sources near 1000 C. Lower-temperature heat sources may be employed as well, at a commensurately higher voltage. Future planned studies would evaluate design/performance tradeoffs and cost/economic advantages derived from interfacing with various primary resources, such as solar thermal as well as coal conversion systems. DOE

N85-14902# Argonne National Lab., Ill. Materials Science and Technology Div.
MECHANISMS OF IMPURITY DIFFUSION IN RUTILE
N. L. Peterson and J. Sasaki (Mitsubishi Chemical Industries, Ltd.) 1984 17 p refs Presented at the 3rd Intern. Conf. on Transport in Non-Stoichiometric Compounds, University Park, Pa., 10-16 Jun. 1984
(Contract W-31-109-eng-38)
(DE84-014741; CONF-8406177-1) Avail: NTIS HC A02/MF A01

Tracer diffusion of (46)Sc, (51)Cr, (54)Mn, (59)Fe, (60)Co, (63)Ni, and (95)Zr, was measured as functions of crystal orientation, temperature, and oxygen partial pressure in rutile single crystals using the radioactive tracer sectioning technique. Compared to cation self-diffusion, divalent impurities (e.g., Co and Ni) diffuse extremely rapidly in TiO2 and exhibit a large anisotropy in the diffusion behavior; divalent-impurity diffusion parallel to the c-axis is much larger than it is perpendicular to the c-axis. The diffusion of trivalent impurity ions (Sc and Cr) and tetravalent impurity ions (Zr) is similar to cation self-diffusion, as a function of temperature and of oxygen partial pressure. The divalent impurity ions Co and Ni apparently diffuse as interstitial ions along open channels parallel to the c-axis. This results suggest that Sc, Cr, and Zr ions diffuse by an interstitialcy mechanism involving the simultaneous and cooperative migration of tetravalent interstitial titanium ions and the tracer-impurity ions. Iron ions diffused both as divalent and as trivalent ions. DOE

N85-14903# Arizona Univ., Tucson. Dept. of Chemistry.
ANALYSIS AND CHARACTERIZATION OF ORGANIC CARBON COMPOUNDS IN ATMOSPHERIC PARTICULATE MATTER Final Report
Henry Freiser and Jarvis L. Moyers Aug. 1984 73 p refs
(Grant EPA-R-805427)
(PB84-232636; EPA-800/3-84-084) Avail: NTIS HC A04/MF A01 CSCL 07D

A macroporous polymer material (Shodex) was evaluated as a stationary phase in liquid chromatography for the separation of a wide variety of aliphatic, oxygenates and polynuclear aromatic compounds using a variety of solvents. Fundamental studies were performed that determined the chromatographic properties of this macroporous polymer packing. A reversed phase ion partition

chromatography procedure was developed by which, through the use of methylene blue, a highly sensitive method for determining sub-microgram quantities of alcohols was developed. Analytical methods to measure the organic and total carbon content of ambient particulate matter collected on Teflon and quartz filters were also intercompared. Estimation of the soot or light absorbing carbon collected on Teflon and quartz filters by use of light absorption methods (light transmission and photoacoustic) compared favorably with the combustion procedure used to measure soot carbon. GRA

N85-14904# Rhode Island Univ., Kingston. Dept. of Chemistry.
IN SITU ANALYSIS OF CORROSIVE AND PASSIVE SURFACES BY LASER-EXCITED RAMAN SPECTROSCOPY
Chris W. Brown Aug. 1984 145 p refs Sponsored by EPA
(PB84-229756; EPA-600/2-84-133) Avail: NTIS HC A07/MF A01 CSCL 07D

The chemical and/or crystallographic composition of surface films on lead and asbestos-cement pipes were studied. Both laboratory and field samples of lead were investigated by Raman and infrared spectroscopy. A number of laboratory samples were investigated in situ using laser-excited Raman spectroscopy. Some field samples of asbestos-cement pipes were studied using infrared spectroscopy. In addition, surface films from field samples of galvanized iron pipes were measured. Variations in the chemical composition of asbestos-cement pipes make it impossible to identify the composition of surface films using spectroscopic techniques; however, surface films on field samples of galvanized iron were identified as zinc carbonates using infrared spectroscopy. GRA

N85-14905# Statewide Air Pollution Research Center, Riverside, Calif.
DIRECT MEASUREMENTS OF NITROUS ACID, NITROGEN DIOXIDE AND FORMALDEHYDE IN AUTO EXHAUST BY DIFFERENTIAL OPTICAL ABSORPTION SPECTROSCOPY Final Report, 27 Nov. 1982 - 29 Feb. 1984
JAmes N. Pitts, Jr. and Arthur M. Winer Mar. 1984 73 p refs Sponsored by California Air Resources Board
(PB84-229269; ARB-R-84/227) Avail: NTIS HC A04/MF A01 CSCL 07D

Continuous ambient air measurements of nitrous acid (HONO), formaldehyde (HCHO) and No2 were obtained at a site adjacent to the I-10 freeway in Upland, CA, using the SAPRC long pathlength differential optical absorption spectrometer (DOAS) with about 0.5 km pathlength. HONO was observed during daylight hours for the first time in the CSCAB and well defined diurnal profiles were observed for HONO, NO2 and HCHO with concentrations up to 3 ppb, 150 ppb and 10 ppb, respectively. The data obtained defined the exposure to HONO of residents living adjacent to this heavily traveled freeway. In addition, direct measurements of HONO, HCHO, NO2, benzaldehyde, and SO2 in light duty motor vehicle (LDMV) exhaust were also obtained. Eight vehicles were analyzed by placing this wall-less DOAS system about 2 m behind the tailpipe. HONO is directly emitted in the exhaust of certain LDMV with markedly higher levels for older vehicles having limited emission control devices and exhibiting higher NOx emissions. GRA

N85-14866# Joint Publications Research Service, Arlington, Va.
GAS CHROMATOGRAPHIC DETERMINATION OF CONTENT OF HARMFUL SUBSTANCES IN AIR OF INDUSTRIAL LOCATIONS Abstract Only
V. M. Pantayeva, T. I. Baskakova, N. M. Kvasha, and T. A. Krendeleva *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 55 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 47-48 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N85-14906 United Kingdom Atomic Energy Authority, Risley (England).
INFLUENCE OF THE MECHANICAL AND ELECTROCHEMICAL CHARACTERISTICS OF AUSTENITIC AND AUSTENOFERRITIC STEELS ON THE PROPAGATION RATE AND MORPHOLOGY OF STRESS CORROSION CRACKING
J. I. Pauthe, D. Desjardins, and M. C. Petit 5 Jul. 1984 18 p refs Transl. into ENGLISH from Mem. et Etudes Sci. Rev. Met. (France), v. 77, no. 5, 1980 p 649-658
(BLL-Risley-Trans-4545-(9091.9)) Copyright. Avail: British Library Lending Div., Boston Spa, England

The mechanical behavior of austenitic stainless steels of the viscoplastic type, which complicates the determination of their elasticity boundary. This boundary is in fact most clearly defined by the non-creep limit. Austenoferritic steels exhibit a very different mechanical behavior, but their elasticity boundary can again be determined from their creep behavior. The non-creep limit is of great importance in stress corrosion, since below this limit the incubation times of cracks become suddenly very much longer. Steels with a high nickel and molybdenum content and austenoferritic steels exhibit an excellent behavior in this stress field. Analysis of crack propagation times indicates that the cracking rates are unaffected by the stress applied above a certain threshold and that cracking becomes progressively slower, the higher the nickel content in the alloy. Results of a study of depassivation processes with an imposed potential show this crack inhibiting effect to be due to a slowing down of the solution rate of the bare metal and a decrease in the solution anisotropy at the bottom of the crack. R.S.F.

N85-14907 British Gas Corp., London (England).
SPECIAL SOFT SOLDER TK-3 (L-SnCu 3 - DIN 1707)
26 Sep. 1984 11 p Transl. into ENGLISH of rept. Chemet G.m.b.H., Wirges, West Germany
(BLL-T6384/BG/WH799/84(9022.48)) Avail: British Library Lending Div., Boston Spa, England

The increased requirements of soft soldered joints in copper pipe installation has led to the development of special lead-free soft solder which, in comparison with the standard tin solder, not only has a good creep strength but also a higher shear strength and thermal stability. For many years the special lead-free soft solder TK-3 containing copper in this series has been successfully used for heating plants, and has not only shown excellent properties but is to some degree even better than the alloy TZ-35 containing silver, and is more reasonably priced. TK-3 is now standardized and approved for water supply installations. Physical properties and differential thermal analysis results are given for TK-3. R.S.F.

N85-14908 British Gas Corp., London (England).
THE METALLURGICAL PROCESSES DURING THE SOFT SOLDERING OF COPPER AND COPPER ALLOYS AND THE STRENGTH CHARACTERISTICS OF SOLDERED JOINTS
H. Zurn and T. Nesse 26 Sep. 1984 31 p refs Transl. into ENGLISH from Met. (USSR), v. 20, no. 11, Nov. 1966 p 1144-1151
(BLL-T6388/BG/WH803/84) Avail: British Library Lending Div., Boston Spa, England

The strength behavior of soldered joints is considered along with the metallurgical processes which occur during the soft soldering of copper and copper alloys. The alloying process between Cu and the solder constituents continues even after solidification. The strength properties of the soldered joint are influenced by both the composition of the solder and the soldering conditions including subsequent heat treatment. R.S.F.

N85-14909 Rolls-Royce Ltd., Derby (England).
STUDY OF FATIGUE FRACTURE IN HARDENED AND TEMPERED CARBON STEEL. REPORT 1: MICROSCOPIC OB-

SERVATION OF THE FATIGUE CRACK FORMATION PROCESS

S. Taira, K. Tanaka, and S. Watanabe 29 Nov. 1984 25 p refs Transl. into ENGLISH from Nippon Kikai Gekkai Ronbunshu (Japan), v. 38, no. 316-12, 1982 p 3059-3066

(BLL-PNR-90242-(8019.3153)) Avail: British Library Lending Div., Boston Spa, England

The increasingly severe conditions to which materials used in the construction of machinery are subjected nowadays have led to a marked increase in the use of hardened and tempered carbon steels since these are comparatively economical materials with high fatigue strength. Consequently, there have been numerous investigations into the fatigue frature characteristics of hardened and tempered materials. Many of these studies are concerned with the structure of the materials before fatigue, their hardness, the distribution of inclusions or residual stress values etc, and with the relationship between fatigue life and the microscopic strength. Little work has been carried out to-date on the practical aspect of the mechanism involved in fatigue fracture. This paper presents a study of fatigue fracture phenomena in hardened and tempered carbon steels on the basis of the microstructural changes of the materials. B.W.

N85-14910 Rolls-Royce Ltd., Derby (England).

METHOD FOR PREDICTING THE CREEP RUPTURE LIFE OF NICKEL-BASE PRECIPITATION-HARDENED SUPERALLOYS FROM THEIR CHEMICAL COMPOSITION

J. Ujioka, T. Miyashita, H. Murase, and Y. Nishiyama 29 Nov. 1984 24 p refs Transl. into ENGLISH from Tetsu to Hagane (Japan), v. 68, no. 3, 1982 p 486-495

(BLL-PNR-90241-(8019.3153)) Avail: British Library Lending Div., Boston Spa, England

A computer and theoretical metallurgical analysis were used to derive estimating equations which were used to calculate the creep and creep rupture strength of 9 types of Ni-base precipitation hardened superalloys. The values for the steady state creep rate and the creep rupture strength were derived from their chemical composition. The calculated values show fairly good agreement with experimental results. The estimating equations were found to be particularly satisfactory for Inconel 713 C type alloys. Accurate results should be obtained for the creep rupture strength of high f values containing tightly packed angular gamma prime particles used for components in contrast with moving parts of equipment. A.R.H.

N85-14911 United Kingdom Atomic Energy Authority, Risley (England).

INVESTIGATIONS INTO THE FATIGUE CRACK GROWTH BEHAVIOUR OF X6CrNI 18 11 (1.4948) AUSTENITIC STAINLESS STEEL

K. Krompholz, E. D. Grosser, and E. Moritz 5 Jul. 1984 32 p refs Transl. into ENGLISH of "Untersuchungen zum Ermuedungs-Risswachstumsverhalten des Austenitischen Stahles X6CrNi 18 11 (1.4948)" rept. INTAT-55.04746.8 Interatom International Atomreaktorbau GmbH, West Germany, Jul. 1981 39 p Submitted for publication

(BLL-Risley-Tr-4544-(9091.9F); INTAT-55.04756.8) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Extensive crack growth investigations under cyclic loading were carried out on the comparable AISI 304 ss steel /2-22/; and up to now, with a few exceptions corresponding information for steel 1.4948 was available only for room temperature. The nature of the fatigue crack growth behavior under the influence of factors whose significance is recognized as important was determined. To this end tensile stress was varied over the temperatue range for which the material would be used (308 to 973 K) with a vary ratio of minimum stress to maximum stress R and also at selected frequencies. Author

N85-14912 Rolls-Royce Ltd., London (England).

INFLUENCE OF THE SHAPE AND DISTRIBUTION OF INCLUSIONS OF THE FATIGUE STRENGTH OF BEARING STEELS IN ROTARY BENDING

I. Kawada, H. Nakazawa, and S. Kodama 29 Nov. 1984 27 p refs Transl. into ENGLISH from Nippon Kikai Gakkai Ronbunshu (Japan), v. 29, no. 206, Oct. 1963 p 1674-1683

(BLL-PNR-90243-(8019.3153)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of inclusions on fatigue strength and the influence of the size, shape and distribution of inclusions on the fatigue strength of bearing steels in rotary bending are investigated. Author

N85-14913# National Aerospace Lab., Tokyo (Japan).

FRACTOGRAPHIC OBSERVATION AND ESTIMATION OF CRACK GROWTH CURVE OF ALUMINUM ALLOY UNDER RAMDOM FLIGHT SIMULATION LOADING

Koji Tsuchida and Kazuo Iwasaki Jul. 1984 14 p refs In JAPANESE; ENGLISH summary

(NAL-TR-824; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Crack growth rates from fractographic observations of fracture surfaces subjected to two kinds of random flight simulation loading were examined. The crack growth curves were estimated under the assumption that the striation spacings correspond to the crack growth per flight. The assumption is concluded to be reasonable by the comparison of estimated and measured curves. Author

N85-14914# National Aerospace Lab., Tokyo (Japan).

WEAR OF ANODIC OXIDE FILMS ON ALUMINUM ALLOYS IN CRYOGENIC LIQUIDS

Mamoru Oike and Masataka Kikuchi Jun. 1984 11 p refs In JAPANESE; ENGLISH summary

(NAL-TR-818; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The wear of several materials rubbed against anodic oxide films on aluminum alloys in liquid nitrogen was studied experimentally. The appearance of wear particles and wear track, the wear rate, and the transverse moment of the slider were examined. The main findings obtained in this study are as follows: (1) the wear particles left the rubbing surfaces at an early stage of growth; namely, the fine wear particles were produced when the sliders were rubbed against the anodic oxide films on aluminum alloys; and (2) the wear particles grew large between the rubbing surfaces when the sliders were rubbed against the disks of aluminum alloys. From these findings, it is concluded that the anodic oxide films formed on the rubbing surfaces of aluminum alloys prevented the large-scale growth of wear particles between these rubbing surfaces in cryogenic liquids. Author

N85-14915# Brown Univ., Providence, R. I. Div. of Engineering.

STRAIN RATE EFFECTS AND TEMPERATURE HISTORY EFFECTS FOR THREE DIFFERENT TEMPERS OF 4340 VAR STEEL

S. Tanimura and J. Duffy Jul. 1984 45 p

(Contract DAAG29-81-K-0121)

(AD-A146372; ARO-18414.7-EG) Avail: NTIS HC A03/MF A01 CSCL 11/6

A series of experiments is described in which specimens of AISI 4340 VAR steel are deformed in shear at temperatures ranging from -190C to 20C. The tests were performed in a torsional Kolsky bar at quasi-static and dynamic strain rates. Before testing all the specimens were normalized, austenitized and tempered either at 200 C, 425 C or 600 C, representing hardnesses of 55, 44, and 33, respectively, on the Rockwell C scale. In addition to constant temperature and constant strain rate tests, a number of experiments was performed to study history effects in these tempers. For this purpose a prestrain was imposed at one temperature and strain rate, followed by continued straining at a new temperature or at a new strain rate. GRA

N85-14916# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.

THE EFFECT OF POTENTIAL ON THE CORROSION FATIGUE BEHAVIOR OF A PRECIPITATION HARDENED ALUMINUM ALLOY Annual Report

E. F. Smith, III and D. J. Duquette Sep. 1984 35 p

(Contract N00014-67-A-0117-0012)

(AD-A146537; Rept-15) Avail: NTIS HC A03/MF A01 CSCL 20/11

Fatigue experiments were conducted on polycrystalline and monocrystalline samples of a high purity Al alloy in the peak-hardened heat treatment condition. These experiments were conducted in dry laboratory air and in 0.5 N NaCl solutions at the corrosion potential and at applied potentials cathodic to the corrosion potential. It has been shown that saline solutions severely reduce the fatigue resistance of the alloy, resulting in considerable amounts of intergranular crack initiation and propagation under freely corroding conditions for polycrystalline samples. Applied cathodic potentials resulted in still larger decreases in fatigue resistance and, for polycrystals, increased the degree of trans-granular crack initiation of propagation. GRA

N85-14917# National Bureau of Standards, Gaithersburg, Md. Metallurgy Div.

APPLICATION OF SOLIDIFICATION THEORY TO RAPID SOLIDIFICATION PROCESSING Semiannual Technical Report, 1 Oct. 1983 - 31 Mar. 1984

W. J. Boettinger, J. W. Cahn, S. R. Coriell, J. R. Manning, and R. J. Schaefer Aug. 1984 73 p

(ARPA Order 3751)

(AD-A146619) Avail: NTIS HC A04/MF A01 CSCL 07/4

Solidification theory can be used to predict and control processes occuring during rapid solidification. Two papers prepared for publication provide results showing such predictions. (1) Interface shapes and compositional fields produced during directional solidification, calculated as a function of solidification velocity, are reported. (2) Rapid solidification microstructures and precipitation produced upon annealing in rapidly solidified Al-Mn alloys having compositions in the extended solid solubility range are reported. Author (GRA)

N85-14918# Army Construction Engineering Research Lab., Champaign, Ill.

A REVIEW OF METALLIC SURFACE TREATMENTS FOR CORROSION MITIGATION Final Report

V. F. Hock, J. M. Rigsbee, and J. H. Boy Sep. 1984 40 p

(AD-A146701; CERL-TR-M-355) Avail: NTIS HC A03/MF A01 CSCL 13/8

Innovative metallic surface treatments for corrosion protection of facility systems and components have been reviewed, including plasma spraying, electroless nickel plating, and ion plating. The work is part of the U.S. Army Corps of Engineers effort to find coatings with properties superior to conventional polymeric types. The three methods were judged for adhesion, corrosion and erosion resistance, rust mitigation, and possible use in electromagnetic shielding. A brief description of physics is given for these methods along with case studies documenting their performance. Such metallic treatments may be a cost-effective, long-term corrosion protection alternative to traditional polymeric coatings, depending on component design and purpose. Author (GRA)

N85-14919# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

APPLICATION OF EXTRACTION REPLICAS AND ANALYTICAL ELECTRON MICROSCOPY TO PRECIPITATE PHASE STUDIES

E. A. Kenik and P. J. Maziasz 1984 9 p Presented at the Microbeam Analysis Society Anal. Electron Microscopy Meeting, Bethlehem, Pa., 19 Jul. 1984

(Contract DE-AC05-84OR-21400)

(DE85-001253; CONF-840767-6) Avail: NTIS HC A02/MF A01

Extraction replicas which provide a powerful extension of AEM techniques for analysis of fine precipitates are outlined. Replicas allow more accurate analyses and, in sometimes, allow unique analyses which cannot be performed in foil. However, there are limitations to the use of extraction replicas in AEM. Often, combined AEM studies of precipitated in foil and on extraction replicas provide complementary and corroborative information for the fullest analysis of precipitate phases. DOE

N85-14920# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

MICROSTRUCTURE OF RAPIDLY QUENCHED TYPE 308 STAINLESS STEEL WELD FILLER METAL AND ITS IMPLICATIONS ON RAPID SOLIDIFICATION PROCESSES

S. A. David and J. M. Vitek 7 Sep. 1984 5 p Presented at the 5th Intern. Conf. on Rapidly-Quenched Metals, Wurzburg, West Germany, 3 Sep. 1984

(Contract DE-AC05-84OR-21400)

(DE85-000930; CONF-8409107-6) Avail: NTIS HC A02/MF A01

The structure of type 308 stainless steel was evaluated following rapid quenching by the hammer arc process. A large degree of variation was found from a fully austenitic structure to the duplex ferrite plus austenite structure commonly found in welded material. The lack of large scale segregation, indicates that structural variations are due to cooling rate changes rather than compositional fluctuations. It is shown that this material is very sensitive to cooling rate in the large prevalent in the hammer arc process. DOE

N85-14921# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

DEVELOPMENT AND CHARACTERIZATION OF DUCTILE LONG-RANGE-ORDERED (LRO) ALLOYS (Fe,Co, Ni)3V FOR HIGH-TEMPERATURE STRUCTURAL USE

C. T. Liu and N. S. Stoloff Aug. 1984 77 p refs

(Contract DE-AC05-84OR-21400)

(DE84-016750; ORNL-6032) Avail: NTIS HC A05/MF A01

Development and characterization of long range ordered (LRO) alloys for structural use is summarized. The ductility and fabricability of the brittle ordered alloys Co3V, (Co,Ni)3V, and Ni3V can be dramatically improved by partially replacing cobalt and nickel with iron to lower the electron concentration and stabilize the cubic ordered crystal structure. The development ductile LRO alloys have superior high temperature properties. Their yield strengths increase with temperature and peak around their critical ordering temperatures. The LRO alloys are much stronger than type 316 stainless steel and Hastelloy X at elevated temperatures. The formation of long range order lowers the steady state creep rate in the vicinity of T/sub c/ by two orders of magnitude. Other properties of the LRO lloys include high and low cycle fatigue, crack growth rate, hydrogen embrittlement, and oxidation and corrosion. These properties can be further improved by adding a small amount of Ti, Zr, Ce, and/or Nb. The potential uses of the LRO alloys for high temperature structural applications are discussed. E.A.K.

N85-14922# Oak Ridge National Lab., Tenn.

METALLOGRAPHIC EVALUATION OF THE REACTIONS BETWEEN BORONATED GRAPHITE AND Fe-Ni-Cr ALLOYS

P. F. Tortorelli, J. R. Mayotte, T. J. Henson, and J. H. DeVan 1984 15 p refs Presented at the 17th Ann. Conv. of the International Metallographic Society, Philadelphia, 15 Jul. 1984

(Contract DE-AC05-84OR-21400)

(DE84-015374; CONF-840766-2) Avail: NTIS HC A02/MF A01

The compatibility of boronated graphite with alloy 800H and type 316 stainless steel was evaluated metallographically after exposures at 700 and 810 C for up to 10,000 h. At 700 C, the principal reaction with both alloys was limited oxidation. At 810 C, three types of reactions were observed: localized reactions at sites where the B4C particles were in contact with the alloys' surfaces, intergranular penetration (much more prevalent for alloy 800H0, and carburization. DOE

N85-14923# Aktiengesellschaft der Dillinger Huettenwerke, Dillingen (West Germany).

IMPROVEMENT OF THE LADLE DEOXIDIZING OF Al-KILLED STEEL Final Report, Sep. 1982

Karl-Heinz Bauer, Herbert Wagner, and Volkmar Troebs Bonn Bundesministerium fuer Forschung und Technologie Aug. 1984 23 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-84-172; ISSN-0340-7608) Avail: NTIS

HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 5

An improvement in Al-varitions and a simultaneous economization of aluminum were obtained by dividing the deoxidation of steel into a first part and a second correction part. The content of disolved aluminum in the ladle sample is decisive for the extent of the correcting deoxidation. In order to avoid a falsification of the Al-analysis by alumina, deep-digging sampling and large volume sampling were developed. Emission spectra analysis with a glow discharge lamp with a large volume sampling probe represents a quick and precise method to determine the metallic aluminum in the ladle. Further improvement of the deoxidation results can be obtained by connecting the Al wire shooting machine to a computer. Author (ESA)

N85-14924# National Bureau of Standards, Washington, D.C. Chemical Engineering Science Div.

THERMAL CONDUCTIVITY OF ALUMINUM, COPPER, IRON AND TUNGSTEN FOR TEMPERATURE FROM 1 K TO THE MELTING POINT

J. G. Hust and A. B. Lankford Jun. 1984 259 p refs (PB84-235878; NBSIR-84-3007) Avail: NTIS HC A12/MF A01 CSCL 11F

Data on the thermal conductivity of commercially pure aluminum, copper, iron, and tungsten specimens was collected, coded, critically analyzed, and correlated with analytical techniques based on theoretical and empirical equations. The resulting functions are presented and used to generate tables and graphs of thermal conductivity as a function of temperature and residual resistivity ratio (RRR). An annotated bibliography of references is included. Discussions are included on the variations in thermal conductivity caused by chemical impurities, physical defects, size effects, and magnetic fields. Smoothed values are presented for temperatures from 1 K to near the melting point and for a large range of RRR values. Author (GRA)

N85-14925# National Bureau of Standards, Washington, D.C.

MEASURING THE CORROSION RATE OF REINFORCING STEEL IN CONCRETE Interim Report, 1980 - 1983

E. Escalante, M. Cohen, and A. H. Kahn Apr. 1984 86 p refs Sponsored in part by Federal Highway Administration (PB84-244532; NBSIR-84-2853) Avail: NTIS HC A05/MF A01 CSCL 11F

Progress in developing a nondestructive method for measuring the corrosion of steel in concrete as related to bridge deck deterioration is reported. Past work is summarized and developments are described. The five phases are: (1) a literature review; (2) preliminary studies; (3) measurements in concrete; (4) field measurements; and (5) development of a microprocessor system. GRA

N85-14926# National Bureau of Standards, Washington, D.C. Fracture and Deformation Div.

EFFECT OF CRACK-TIP REGION CONSTRAINT ON FRACTURE IN THE DUCTILE-TO-BRITTLE TRANSITION

T. L. Anderson May 1984 213 p refs Sponsored in part by Minerals Management Service (PB84-237395; NBSIR-84-3001) Avail: NTIS HC A10/MF A01 CSCL 11F

The effect of geometry on fracture toughness of steel in the ductile-to-brittle transition region was studied. The critical crack-tip opening displacement (CTOD) and the critical J-integral were measured as a function of temperature for ten fracture specimen configurations of ABS grade EH36 steel. A technique was developed to experimentally measure crack-tip constraint. Constraint decreased with crack blunting. This relaxation in constraint was modeled by a simple spring analog. The model was used to predict ductile-to-brittle transition curves for hypothetical structures. Some of the applications and limitations of the model are discussed. GRA

N85-15096# Sheffield Univ. (England). Dept. of Metallurgy.

MODELING MICROSTRUCTURAL CHANGES DURING HOT ROLLING OF STEELS

C. M. Sellars *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 9 p refs (For primary document see N85-15086 06-31) Avail: NTIS HC A08/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N85-14927 Department of the Air Force, Washington, D.C.

FLUORINATED ALIPHATIC POLYALKYLETHER LUBRICANT WITH AN ADDITIVE COMPOSED OF AN AROMATIC PHOSPHINE SUBSTITUTED WITH PERFLUOROALKYLETHER GROUPS Patent

C. E. Snyder, Jr. and C. Tamborski, inventors (to Air Force) Issued 17 Apr. 1984 3 p Supersedes AD-D009834 (AD-D011286; US-Patent-4,443,349; US-Patent-Appl-SN-417931; US-Patent-Class-252-49.9) Avail: US Patent and Trademark Office CSCL 11/8

It is an object of this invention to provide a lubricant composition which has little if any corrosive effect upon ferrous alloys. Another object of the invention is to provide a lubricant composition which has a relatively constant viscosity over a wide temperature range. There is provided a lubricant composition comprising a base fluid consisting essentially of a mixture of fluorinated polyethers and a corrosion inhibiting amount of a substituted aromatic phosphine. GRA

N85-14928*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECTS OF SILVER AND GROUP 2 FLUORIDES ADDITION TO PLASMA SPRAYED CHROMIUM CARBIDE HIGH TEMPERATURE SOLID LUBRICANT FOR FOIL GAS BEARING TO 650 DEG C

R. C. Wagner (Case Western Reserve Univ.) and Harold E. Sliney [1984] 26 p refs Presented at the Ann. Meeting of the American Society of Lubrication Engineers, Las Vegas, Nev., 6-9 May 1985 (Contract DE-AI01-80CS-50194) (NASA-TM-86895; E-2317; DOE/NASA/50194-40; NAS 1.15:86895) Avail: NTIS HC A03/MF A01 CSCL 11H

A new self-lubricating coating composition of nickel aluminide-bonded chromium carbide formulated with silver and Group II fluorides was developed in a research program on high temperature solid lubricants. One of the proposed applications for this new coating composition is as a wide temperature spectrum solid lubricant for complaint foil gas bearings. Friction and wear properties were obtained using a foil gas bearing start/stop apparatus at temperatures from 25 to 650 C. The journals were Inconel 718. Some were coated with the plasma sprayed experimental coating, others with unmodified nickel aluminide/chromium carbide as a baseline for comparison. The addtitional components were provided to assist in achieving low friction over the temperature range of interest. Uncoated, preoxidized Inconel X-750 foil bearings were operated against these surfaces. The foils were subjected to repeated start/stop cycles under a 14-kPa (2-psi) bearing unit loading. Sliding contact occurred during lift-off and coastdown at surface velocities less than 6 m/s (3000 rpm). Testing continued until 9000 start/stop cycles were accumulated or until a rise in starting torque indicated the journal/bearing had failed. Comparison in coating performance as well as discussions of their properties and methods of application are given. Author

N85-14929*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF SUBSTITUTED PHENYLNADIMIDES ON PROCESSING AND PROPERTIES OF PMR POLYIMIDE COMPOSITES

William B. Alston and Richard W. Lauver 1985 19 p refs Presented at the 30th Natl. SAMPE Symp. and Exhibition, Anaheim,

Calif., 19-21 Mar. 1985
(NASA-TM-86902; E-2380; USAAVSCOM-TR-84-C-20; NAS 1.15:86902) Avail: NTIS HC A02/MF A01 CSCL 11B

Three nitrophenylnadimide cure initiators and two phenylnadimides (without nitros) were evaluated as additives to PMR-15 resins and Celion 6000 graphite fiber composites. The results of a resin screening study eliminated all of the additives except 3-nitrophenylnadimide (NO2PN) for use as a low temperature curing additive for PMR-15. Thus, NO2PN and the two control additives were investigated in PMR-15 formulations from which Celion 6000 graphite fiber/PMR-15 composites were processed both with low temperature (274 C) and normal (316 C) cure cycles. Comparisons of the two processing cycles, the resultant glass transition temperatures (Tg), the ambient, 274 and 316 C composite mechanical properties determined before and after 316 C postcure, the 316 C thermo-oxidative weight losses and the retention of 316 C composite mechanical properties are presented. Empirical correlations of the type and amount of nadimide additives with processing parameters, Tg, composite mechanical properties, composite thermo-oxidative stability and long term retention of 316 C composite mechanical properties are also presented.
Author

N85-14930# Pennsylvania State Univ., University Park. Dept. of Chemistry.
POLYMERIZATION AND HALOGEN SCRAMBLING BEHAVIOR OF PHENYL-SUBSTITUTED CYCLOTRIPHOSPHAZENES Interim Technical Report
H. R. Allcock and M. S. Connolly 7 Sep. 1984 50 p
(Contract N00014-84-K-0477)
(AD-A146366; TR-34) Avail: NTIS HC A03/MF A01 CSCL 07/3

A new series of poly(organophosphazenes) with phenyl groups bonded to the skeleton has been prepared by the polymerization of phenylhalogen cyclotriphosphazenes. In addition, evidence about the mechanism of chlorophosphazene polymerization has been obtained by halogen scrambling studies. GRA

N85-14931# Arizona Univ., Tucson. Dept. of Chemistry.
SYNTHESIS OF FILM-FORMING ELECTRON-ACCEPTING POLYMERS Final Technical Report, 15 Jan. 1982 - 14 Jul. 1984
H. K. Hall, Jr. Sep. 1984 8 p
(Contract DAAG29-82-K-0049)
(AD-A146430; ARO-18432.5-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

Certain organic charge-transfer salts behave as organic or molecular metals and show conductivity. But these salts have weak interactions between the layers of donors and acceptors which make them fragile and difficult to fabricate. The objective of this research was to incorporate electron-poor sites in a polymer chain. After polymerization, these sites can be complexed with appropriate electron-donating compounds, and lead to charge-transfer complex salts that are incorporated in a strong matrix. However, the intermediate to the electron-poor polymers proved to be too difficult to synthesize. Author (GRA)

N85-14932# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricants Research Lab.
STANDARDIZATION OF FLAMMABILITY TESTS FOR HYDRAULIC FLUIDS Final Report, 5 May - 30 Sep. 1983
M. D. Kanakia, L. G. Dodge, T. J. Callahan, and B. R. Wright 30 Sep. 1983 70 p
(Contract DAAK70-83-C-0070)
(AD-A146468; AFLRL-181) Avail: NTIS HC A04/MF A01 CSCL 11/8

The modification of the physical and chemical properties of various fluids developed for use as hydraulic fluids has necessitated the development or modification of tests required to evaluate the performance criteria of these fluids. The Federal Government utilized certain Federal Test Methods and ASTM flammability test procedures in fluid specification requirements to determine the relative flammability of fluids currently being developed for use as hydraulic fluids. These tests include the flash and fire points, autoignition temperature, flame propagation, high-pressure spray, and hot manifold ignition test procedures. Unfortunately, as fluid composition and applications change, new or modified tests must be developed to provide accurate assessments of the fluids' performance. This report presents the results produced by a systematic study of mist-flammability parameters that will lead to development of a standard mist-flammability test for hydraulic fluid specification purposes. GRA

N85-14933# Ultrasystems, Inc., Irvine, Calif.
BORON-NITROGEN POLYMERS. 1: MECHANISTIC STUDIES OF BORAZINE PYROLYSES Interim Technical Report
K. J. L. Paciorek, D. H. Harris, and R. H. Kratzer 28 Sep. 1984 23 p
(Contract N00014-82-C-0402)
(AD-A146470; SN-2022-11) Avail: NTIS HC A02/MF A01 CSCL 07/4

Pyrolyses of B-triamino-N-triphenyl-, B-triamino-N-trimethyl-, and B-trianilino-borazines were performed between 150 and 300 C. Initial stages of degradation were accompanied by liberation of ammonia in addition to the expected aniline or methylamine; this was most pronounced for the methyl borazine. Aniline elimination proceeded more readily with the B-anilino than the B-amino isomer. Data obtained support a ring opening mechanism resulting in telomerization accompanied by aniline liberation and formation first of singly then doubly bridged dimers and finally doubly bridged tetramers. Thermal exposure up to 1000 deg C failed to give boron nitride; carbon was invariably retained. Author (GRA)

N85-14934# Rensselaer Polytechnic Inst., Troy, N. Y.
THE CONCEPT OF SOLID SOLVENT AS PROCESSING AID
C. I. Chung 20 Sep. 1984 37 p
(Contract N00014-83-K-0424)
(AD-A146556; TR-1) Avail: NTIS HC A03/MF A01 CSCL 11/11

The concept of solid solvent entails the use of a low molecular weight crystalline materials (LMC) as a processing aid. A LMC as an ideal solid solvent mixed into a polymer is expected to become a solvent for the polymer at high processing temperature reducing the melt viscosity and thus enhancing the processability, but to become a non-solvent for the polymer at low use temperatures precipitating out of the polymer without adversely affecting the properties of the polymer. The feasibility of such concept was examined using acetanilide as a potential solid solvent for polystyrene (PS) and Kraton 1101, a block copolymer containing PS blocks. Acetanilide demonstrated the essential features required of a solid solvent supporting the concept of solid solvent. It had a high solubility in PS at high temperatures very effectively reducing the melt viscosity of PS and Kraton 1101, and it precipitated out of PS at low temperatures although it had an undesirably high residual solubility. The concept of solid solvent appears to be a viable one. Author (GRA)

N85-14935# Department of the Navy, Washington, D. C.
PREPARATION OF POLYMERS OF FUNCTIONALIZED ACETYLENES Patent Application
T. J. Katz and T. H. Ho, inventors (to Navy) Filed 4 Jan. 1984 17 p
(AD-D011296; US-Patent-Appl-SN-567992) Avail: NTIS HC A02/MF A01 CSCL 07/3

Polymers of acetylenes containing functional groups not attached to the triple bond thereof have been prepared by combining the acetylene with either of two reagents. Novel features of the invention include the preparation of polymers consisting of a carbon skeleton of alternating single and double bonds with functional groups attached to this skeleton by one or more saturated carbon atoms; and new procedures for polymerizing acetylenes and particularly those containing functional groups. GRA

N85-14936# Argonne National Lab., Ill.
POLARIZATION IN CHEMICALLY DOPED HYDROGEN-RICH GLASSES

D. Hill, J. Hill, and M. Krumpole (Illinois Univ., Chicago) 27 Aug. 1984 23 p refs Presented at the 4th Workshop on Polarized Target Mater. and Tech., Bonn, Sep. 1984
(Contract W-31-109-eng-38)
(DE84-017486; ANL-HEP-CP-84-61; CONF-8409134-1) Avail: NTIS HC A02/MF A01

Dynamic polarization in chemicaly doped glasses consisting of borane complexes dissived in ammonia and primary amines was investigated. Proton polarization > 80% is achieved in a (3)He cryostat at 2.5T in glasses containing 16 wt.% hydrogen. Details of the sample preparations and the dependence of the polarization on several sample parameters, calorimetric properties, polarization of the background (11)B spins, and (2)H polarization in a deuterated analog material are outlined. DOE

N85-14937# California Univ., Livermore. Lawrence Livermore Lab.
OPTIMIZATION OF THE DIE ENTRANCE SHAPE FOR POLYMERIC EXTRUSION
R. M. Christensen 5 Oct. 1984 20 p ref
(Contract W-7405-eng-48)
(DE85-001588; UCID-20217) Avail: NTIS HC A02/MF A01

Optimal shapes for the entrance section to the die in polymer extrusion problems were found. Simplifying assumptions to permit direct solution of the nonNewtonian flow problem are introduced. It is shown that the optimal shape reduces a component of the acceleration gradient by orders of magnitude compared with that existent in standard entrance sections. This difference is related to a corresponding difference in tensile stresses which are caused by the extensional nature of the flow. DOE

N85-14938# California Inst. of Tech., Pasadena. Dept. of Chemical Engineering.
THE EFFECT OF PRESSURE ON THE MECHANICAL PROPERTIES OF POLYMERS. PART 2: MEASUREMENT OF THE TIME-DEPENDENT POISSON'S RATIO Final Report
N. W. Tschoegle Oct. 1984 65 p refs
(Contract DE-AT03-76ER-75016)
(DE85-002139; DOE/ER-75016/T3-Pt-2) Avail: NTIS HC A04/MF A01

The time dependent Poisson's ratio on a styrene butadiene rubber (SBR) was measured. Water condensation occurred when the bath returned to room temperature below -10(0)C. A sample of a styrene butadiene block copolymer evinced considerable relaxation at room temperature. The Poisson's ratio is quite high. It is suggested that the high values of (MU)(t) recorded on the block copolymer could result from strain induced anisotropy. Such anisotropy can produce E to G ratios well in excess of 3, the theoretical value for homogeneous isotropic rubber. By the relation (MU) = E/2G - 1, an E to G ratio of 3.2 yields a Poisson's ratio of 0.6. (MU)(t) shows an inflection around 15 minutes which is just barely noticeable in E(t). DOE

N85-14939# Sandia Labs., Albuquerque, N. Mex.
STRUCTURAL EVOLUTION DURING THE GEL TO GLASS CONVERSION
C. J. Brinker, E. P. Roth, G. W. Scherer (Corning Glass Works, N.Y.), and D. R. Tallant Jul. 1984 30 p refs Presented at Effects of Modes of Formation on the Struct. of Glass Meeting, Nashville, Tenn., 9 Jul. 1984
(Contract DE-AC04-76DP-00789)
(DE84-014954; SAND-84-0774C; CONF-840768-1) Avail: NTIS HC A03/MF A01

Differential scanning calorimetry (DSC) was used to quantitatively measure enthalpic changes which accompany gel densification and these changes were related to the evolving gel structure using Raman spectroscopy, gas adsorption, and thermal analysis. It is shown that the network structure, which results principally from skeletal dehydration during gel densification, is considerably different from the melt glass structure. A dramatic reduction in the glass transition temperature and the formation of metastable M-O-M bonds as a product of condensation reactions are examples of these differences. Once the gel has been densified and heated above T/sub g/, its structure and properties, viscosity and distribution of relaxation times, become indistinguishable from those of the conventionally melted glass.

N85-14940# DL Labs., New York, N.Y.
EVALUATION OF PROPERTIES OF VARNISHES, EXTERIOR STAINS AND EXTERIOR PRIMERS Final Report, 30 Jul. 1983 - 30 Apr. 1984
J. J. Wilner, S. Spindel, and S. B. Levinson 6 Jan. 1984 87 p refs Sponsored by State of California
(PB84-243948; DL-6189; ARB-R-84/229) Avail: NTIS HC A05/MF A01 CSCL 11C

Results of a project to evaluate the performance of recently developed water-based and low-solvent varnishes, exterior stains and exterior primers to determine if these products have properties equivalent to the conventional high-solvent products which are now used for the same purpose are discussed. Products were solicited from a select group of coating and raw material suppliers. A total of 16 companies responded, submitting samples of 30 low-solvent and 25 conventional coatings, including interior and exterior varnishes, semi-transparent and opaque stains, and primers. Standard test methods were used. Some of the new products tested had performance properties equivalent to or better than the conventional high-solvent coatings. The appendices contain test data and procedures. GRA

N85-14867# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF POLYCAPROAMIDE FIBERS MODIFIED BY GRAFTED POLYACRYLONITRILE Abstract Only
S. E. Shalabi, I. S. Afanasyeva, G. A. Gabriyelyan, and T. V. Druzhinina *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 56 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 32-33 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14868# Joint Publications Research Service, Arlington, Va.
LOW TEMPERATURE SYNTHESIS OF POLYCAPROAMIDE COPOLYMERS GRAFTED WITH POLYDIMETHYLAMINOTHYLMETHACRYLATE Abstract Only
A. P. Khardin, V. F. Zheltobryukhov, and M. K. Tatarnikov *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 56 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 33-34 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14869# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF REINFORCED COMPOSITE THREADS BASED ON POLYMER MIXTURES Abstract Only
M. V. Tsebrenko *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 57 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, Mays - Jun. 1984 p 35-37 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14870# Joint Publications Research Service, Arlington, Va.
FIRE RETARDANT CELLULOSEHYDRATE FIBERS Abstract Only
A. Ya. Ivanova, N. S. Zubkova, M. A. Tyuganova, and L. S. Galbraykh *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 57 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 37-38 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14871# Joint Publications Research Service, Arlington, Va.
IMPROVED UNIFORMITY OF VISCOUS TEXTILE FIBERS OBTAINED BY ALTERING DRYING PROCEDURES Abstract Only
A. D. Kirillov, A. T. Serkov, A. S. Shevchenko, and A. L. Kaller *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 58 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 40-41 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14872# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF ANTIMICROBIAL CHEMICAL FIBERS AND FIBROUS MATERIALS CONTAINING QUATERNARY AMMONIUM COMPOUNDS AND THEIR UTILIZATION Abstract Only
V. M. Vaynburg, I. I. Shamolina, and L. A. Volf *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 58 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 3, May - Jun. 1984 p 42-44 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14873# Joint Publications Research Service, Arlington, Va.
FORMING FLUORINE-CONTAINING THREADS FROM VINYLIDENE FLUORIDE-TETRAFLUOROETHYLENE COPOLYMER BY DRY METHOD Abstract Only
B. S. Vesayte, A. V. Bezprozvannykh, A. I. Logvinov, L. Ya. Madorskaya, and L. A. Volf *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 59 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 13-14 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14874# Joint Publications Research Service, Arlington, Va.
STUDY OF EFFECTIVENESS OF FIRE-RESISTANT ACTIVITY OF ANTIPYRENES FOR FIBERS OF AROMATIC POLYAMIDES Abstract Only
A. Ya. Ivanova, M. A. Tyuganova, L. S. Galbraykh, A. V. Volokhina, and T. S. Sokolova *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 59 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 18-20 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14875# Joint Publications Research Service, Arlington, Va.
POLYMER-CARBON BLACK INTERACTION IN ELECTRICALLY CONDUCTING FIBER-FORMING COMPOSITES Abstract Only
L. Ya. Konovalova, S. G. Yefimova, N. B. Pokrovskaya, and A. A. Nikitin *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 60 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 23-24 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14876# Joint Publications Research Service, Arlington, Va.
EFFECT OF POLYMER MATRIX ON PROPERTIES OF FIBERS OBTAINED BY CAKING POLYMER DISPERSIONS Abstract Only
A. L. Koldobskiy, G. S. Dreyzenshtok, Ye. Ya. Sorokin, K. Ye. Perepelkin, and L. V. Slinko *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 61 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 29-30 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

N85-14877# Joint Publications Research Service, Arlington, Va.
PREPARATION OF FIRE-RESISTANT INFUSIBLE POLYCAPROAMIDE FIBER Abstract Only
A. V. Efros, M. A. Tyuganova, and L. S. Galbraykh *In its* USSR Rept.: Chem. (JPRS-UCH-84-012) 6 Nov. 1984 p 61 Transl. into ENGLISH from Khim. Volokna (Moscow), no. 6, Nov. - Dec. 1983 p 31-32 (For primary document see N85-14865 06-23)
Avail: NTIS HC A05/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N85-14941 Department of the Air Force, Washington, D.C.
DETONATOR BLOCK Patent
B. B. Jones, inventor (to Air Force) Issued 17 Apr. 1984 4 p Supersedes AD-D009572
(AD-D011248; US-Patent-4,442,776; US-Patent-Appl-SN-370232; US-Patent-Class-102-275.12) Avail: US Patent and Trademark Office CSCL 19/1

This patent discloses a detonator block which permits the explosion of a primary detonator and the resultant explosion of an associated primary detonating cord, but which at the same time prevents damage to or explosion of an adjacent secondary detonator and its associate secondary detonating cord. GRA

N85-14942 Department of the Army, Washington, D. C.
EMBEDMENT SYSTEM FOR ULTRAHIGH-BURNING RATE PROPELLANTS OF SOLID PROPULSION SUBSYSTEMS Patent
D. C. Sayles, inventor (to Army) Issued 10 Apr. 1984 5 p
(AD-D011257; US-Patent-4,441,942; US-Patent-Appl-SN-455366; US-Patent-Class-149-19.6) Avail: US Patent and Trademark Office CSCL 21/9

An improved embedment system is disclosed which is comprised of an embedment granule portion in percent by weight of nitrocellulose about 23.0, nitroglycerine of about 15.0, resorcinol of about 1.5, 2-nitrodiphenylamine of about 1.0, ammonium perchlorate (10 micrometers) of about 45.5, and aluminum powder (20 micrometers) of about 14.0 and an embedment resin portion in percent by weight of bisphenol A-epichlorohydrin of about 44, epoxidized dimer acid of about 20, and a curative which is the condensation product of 2 moles of 1,2-bis(maleimido)ethane and one mole of triaminiotriazine of about 36.0. This embedment system has superior characteristics of a high peel strength and greater resistance to penetration by or absorption of carboranylmethyl propionate or casting solvent absorption. Author (GRA)

N85-14943# Catholic Univ. of America, Washington, D.C. Dept. of Chemistry.
STORAGE STABILITY OF JET FUELS Final Report, Feb. 1983 - Aug. 1984
N. C. Li Aug. 1984 45 p
(Contract N00014-83-K-2013)
(AD-A146360) Avail: NTIS HC A03/MF A01 CSCL 21/4

Storage stabilities of jet fuels derived from petroleum were determined using laser light scattering, sediment formation, and oxygen uptake measurements. Fuel degradation was monitored in the presence of the following added specific compounds: 2,5-dimethylpyrrole (DMP), N-methyl pyrrole (NMP), thiophenol, thiophene, decanethiol, dibutyl sulfide, dibutyl disulfide, tetrahydrothiophene, hexadienes, 1-hexene, indene, and dimethyl quinoline (DMQ) and mixtures of these at various temperatures. The light scattering results are correlated with extent of deposit formation, which is an accepted measure of stability, and with oxygen uptake results. GRA

N85-14944# Naval Weapons Center, China Lake, Calif.
EFFECTS OF SURFACE INTERACTIONS AND MECHANICAL PROPERTIES OF PBXS (PLASTIC BONDED EXPLOSIVES) ON EXPLOSIVE SENSITIVITY Annual Report, 1 Oct. 1982 - 30 Sep. 1983
E. C. Martin and R. Y. Yee Aug. 1984 31 p
(AD-A146368; NWC-TP-6560) Avail: NTIS HC A03/MF A01 CSCL 19/1

Much of the first year's effort was spent on materials acquisition, preparation, and characterization. For this study, four binders were selected as the baseline materials. The surface properties of these binders were determined and the results were used to predict the bonding behavior between each binder and RDX. A fracture free energy model was used to predict the bond stability of each RDX-binder system. Model formulations are being made using the baseline binders. Experimental samples from one mix were sent to evaluators at NWC. The samples were used to determine

ignition characteristics, mechanical properties, thermal properties and sensitivity characteristics. GRA

N85-14945# Cambridge Univ. (England).
DEFORMATION, FRACTURE AND EXPLOSIVE PROPERTIES OF REACTIVE MATERIALS Interim Report
J. E. Field, M. M. Chaudhri, K. Mohan, G. M. Swallowe, and S. J. P. Palmer Jun. 1984 7 p
(Contract DAJA45-84-C-0018)
(AD-A146396; R/D-4380-R-AN) Avail: NTIS HC A02/MF A01 CSCL 19/1

This interim report summarizes progress in five areas of research: Drop-weight impact studies; deformation stress of explosive crystals; recording of hot-spots; studies on PBX explosives; and thermal, fracture and laser-induced decomposition of PETN. GRA

N85-14946# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CRITICAL ANALYSIS OF NITRAMINE DECOMPOSITION DATA. PRELIMINARY COMMENTS ON AUTOACCELERATION AND AUTOINHIBITION IN HMX AND RDX DECOMPOSITION Final Report
M. A. Schroeder Aug. 1984 36 p
(DA Proj. 1L1-61102-AH-43)
(AD-A146570; AD-F300475; ARBRL-MR-03370) Avail: NTIS HC A03/MF A01 CSCL 19/1

This paper presents some preliminary comments on a literature review on topics related to autocatalysis in the thermal decomposition of HMX and RDX. An attempt is made to focus on true homogeneous chemical effects in autocatalysis; it is pointed out that it is necessary to distinguish between true chemical effects on the one hand and autoacceleration due to physical factors such as liquefaction on the other hand. The subject is divided into two general areas: (1) autocatalysis due to the non-volatile residue that is formed in HMX and RDX decomposition; and (2) autocatalysis due to more volatile reaction products such as HOCH(2)NHCOH, H(2)CO and nitrogen oxides. There does seem to be evidence indicating the existence of homogeneous chemical autocatalysis by the decomposition residue. With regard to true chemical autocatalysis by more volatile reaction products, a number of pieces of information seem to suggest that such autocatalysis operates, but there are also a few confusing notes. Some possible chemical mechanisms that might be involved are presented and discussed, and it is pointed out that even if such reactions are unimportant under low-pressure conditions, they may become more important under the higher pressures characteristic of combustion and explosion. Suggestions for future work are made, with emphasis on studies allowing unambiguous interpretation in terms of true chemical effects, uncomplicated by physical factors such as liquefication and thermal effects. GRA

N85-14947# Maryland Univ., College Park.
MICROSTRUCTURAL ORIGINS OF HOT SPOTS IN RDX EXPLOSIVE AND A REFERENCE INERT MATERIAL Annual Progress Report, 1 Oct. 1982 - 30 Sep. 1983
W. L. Elban, J. C. Hoffsommer, C. S. Coffey, K. C. Yoo, and R. G. Rosemeier May 1984 37 p
(Contract N00014-82-K-0263; DA Proj. R02-402)
(AD-A146685; NSWC-MP-84-200; APR-2) Avail: NTIS HC A03/MF A01 CSCL 19/1

The crystalline perfection in production-grade RDX material has been investigated using Berg-Barrett and Laue X-ray diffraction techniques. Particularly noteworthy is the observation by X-ray topography that pores within the crystals appear to be surrounded by a strain-free matrix. Fracto-emission experiments on production-grade and NSWC laboratory-grown RDX were performed in collaboration with Washington State University researchers. The purpose was to study the early stages of decomposition resulting from fracture. Different electron emission behaviors were observed and attributed to the nature of the fracture that occurred. Gas chromatographic analyses were performed on production-grade RDX samples that had been impact loaded to investigate whether any solid state decomposition had occurred. The trinitroso analog of RDX (called R-salt) was identified in impacted RDX residue. Hardness testing has been used to investigate the local deformation of MgF2 crystals (selected as a reference inert material). A considerable anistropy in hardness was found; the extent of the strain fields differed appreciably with crystal orientation. Fractoemission experiments were also performed on MgF2 and revealed a strong crystallographic dependence for electron emission. Nh4C104 exhibited a substantial hardness anisotropy in an initial study that was conducted. Author (GRA)

N85-14948# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
DOE SUPPORTED RESEARCH IN ALCOHOL FUEL TECHNOLOGY DEVELOPMENT
Julianne Dodds 1984 16 p Presented at the 8th Ann. Symp. on Energy from Biomass and Wastes, Lake Buena Vista, Fla., 30 Jan. 1984
(DE84-007686; EGG-M-25483; CONF-840111-6) Avail: NTIS HC A02/MF A01

The Department of Energy sponsored research in alcohol fuel technology development under the direction of Congress and Public Law 96-126. Twenty-seven research grants of about $50,000 each were funded to develop lower cost methods for alcohol fuel production. This paper discusses the objectives of the program and relates the accomplishments achieved by the research. A discussion of the highlights of several selected projects is included. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N85-14949# Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
DEVELOPMENT OF INTERCALATED WIRE AND CABLE Final Report
F. L. Vogel Feb. 1984 0041 p
(Contract DAAK70-79-C-0244; DA Proj. 1L1-61102-AH-51)
(AD-A146502) Avail: NTIS HC A03/MF A01 CSCL 20/3

An extensive study was conducted on the swaging of composite wires consisting of an intercalated graphite core in a copper sheath. The purpose was to develop a method that replicated earlier results wherein high electrical conductivity was encountered. The project was unable to produce those earlier, favorable results. It was determined that analysis of core resistivity cannot be done where the core has a higher resistivity than the sheath. Copper chloride was shown to be an air stable intercalant in graphite with a crystal resistivity in the vicinity of 5 x 10 to the minus 6 ohm cm. The main problem of swaging cored tube samples remains unsolved. Author (GRA)

N85-14950# ERES Consultants, Inc., Champaign, Ill.
SYNTHESIS STUDY OF NONDESTRUCTIVE TESTING DEVICES FOR USE IN OVERLAY THICKNESS DESIGN OF FLEXIBLE PAVEMENTS Final Report, Sep. 1982 - Sep. 1983
Roger E. Smith and Robert L. Lytton Apr. 1984 137 p refs
(Contract DTFH61-82-C-00073)
(PB84-218080; FHWA/RD-83-097) Avail: NTIS HC A07/MF A01 CSCL 13B

A ready reference for highway engineers who are interested in purchasing nondestructive testing (NDT) equipment for use in designing overlays for flexible pavements was prepared. All commercially available equipment is described. Information includes basic descriptions plus current prices quoted by the manufacturers/distributors. To determine user comments, a questionnaire was sent to nine State agencies, and one Federal agency. The responses to these questionnaires are summarized. Overlay thickness design procedures for flexible pavements are reviewed. Important components related to the use of NDT deflection

measuremnts in overlay design are identified and addressed. Summary tables of equipment characteristics and overlay design procedures are presented. GRA

N85-14951# Thermo Electron Corp., Waltham, Mass.
OPEN-CYCLE VAPOR COMPRESSION HEAT PUMP Annual Report, Apr. 1983 - Apr. 1984
F. E. Becker and A. E. Ruggles May 1984 57 p refs Sponsored by Gas Research Inst.
(PB85-101475/GAR; TE4224-106-84; GRI-84/0130) Avail: NTIS HC A04/MF A01 CSCL 13A

Large quantities of low-grade energy in the form of low-pressure steam and low-temperature heat are wasted by industry. The practical and economical recovery of energy from these sources is often limited by the number of applications for the use of low-temperature heat. Thermo Electron has developed an open-cycle steam heat pump system capable of the direct recovery and upgrading of low-grade waste steam. The system compresses low-pressure waste steam (or steam made from sources of low-temperature waste heat) to produce high-pressure steam suitable for use in industrial processes. A prototype system was developed that is capable of recovering and recompressing up to 10,000 lb/hr of waste steam, while using only 50 percent of the fuel that would be required to produce comparable steam in a boiler. The prototype steam recompression system, using a 2200-cfm rotary screw compressor driven by a 500-hp natural gas engine, was tested for a yearlong field test. GRA

N85-14952# Copper Development Association, Inc., New York, N. Y.
COPPER-NICKEL SHEATHING STUDY, PHASE 2. TWO-YEAR SERVICE PERFORMANCE OF TEST PANELS ON THE ARCO TEXAS Final Report
31 May 1984 76 p refs
(Contract MA81-SAC-10074)
(PB84-242411; MA-RD-770-84048) Avail: NTIS HC A05/MF A01 CSCL 13I

The results of a two-year, in-service test of Copper-Nickel (Cu-Ni) panels emplaced on the underwater hull surfaces of the SS ARCO TEXAX are described. Four groups of Cu-Ni test panels were installed on the SS ARCO TEXAS, a crude oil tanker. Each group was attached to the hull by a different method. Two of the attachment methods give a throughly satisfactory performance, remaining tightly in place against the hull under severe berthing and canal-lock conditions. The test showed no evidence of galvanic corrosion on nearby steel hull plates. No bio-fouling could be detected on the Cu-Ni panels. In contrast, the steel hull exhibited extensive algal growth after two years of service. The surface roughness of the panels remained almost hydrodynamically smooth over the test period - measuring approximately 50 micrometers average roughness. The steel hull, by contrast, roughened considerably over the two years. Full technical descriptions of the test and results, along with excellent color photographs of the hull and test panels, are presented. GRA

N85-14953# National Bureau of Standards, Washington, D.C. Center for Building Technology.
PULSE-ECHO METHOD FOR FLAW DETECTION IN CONCRETE Final Report
N. J. Carino and M. Sansalone Jul. 1984 42 p refs
(PB84-234509; NBS/TN-1199) Avail: NTIS HC A03/MF A01; also available SOD CSCL 13C

The basic principles of the pulse-echo method for the detection of internal flaws in concrete are presented. As the heterogeneous nature of concrete poses problems not encountered in pulse-echo evaluation of metals, progress in this area of concrete nondestructive testing has been slow. A review of past research shows that pulse-echo techniques have been used successfully to detect flaws within concrete; however, no standardized method currently exists for pulse-echo evaluation of concrete structures. Based on the current state of knowledge, areas of needed research are outlined. Author (GRA)

N85-14954# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ENGINEERING AND EQUIPMENT Abstracts Only
14 Nov. 1984 67 p Transl. into ENGLISH from various Russian articles
(JPRS-UEQ-84-007) Avail: NTIS HC A04/MF A01

Abstracts of articles addressing specific topics in several branches of engineering are presented. The subject areas include aeronautical and space engineering, nuclear and non-nuclear energy technology, industrial technology, turbine and engine design, guidance, high energy devices and optics, fluid mechanics, and structural and materials science. For individual titles, see N85-14955 through N85-14990.

N85-14955# Joint Publications Research Service, Arlington, Va.
ITERATIVE METHOD OF CALCULATING STRENGTH OF AIRFRAME MEMBERS USING FINITE ELEMENT METHOD Abstract Only c05
S. M. Bastrakov, Yu. A. Denisov, and Yu. G. Popov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 9-14 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Problems of deriving the exact solution of systems of linear equations more rapidly for analyzing structures stated nonlinearly are examined, along with aspects of developing the iterative method further. The iterative strength analysis method is extended from the shift method (beam scheme) to the method of forces. Reducing the problem of analyzing airframe members under conditions of physical nonlinearity to matrix manipulation by augmentation during each iteration speeds up the calculation by a factor of 6 to 9 over solutions using other manipulation methods in all stages. Author

N85-14956# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF PARAMETERS OF CUPPED AIRCRAFT LANDING SKI Abstract Only c05
A. K. Churusov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviat. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 9-14 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The parameters of cup-shaped circular aircraft landing skis are analyzed. It is found that circular skis provide an effective means for improving aircraft ground mobility. Author

N85-14957# Joint Publications Research Service, Arlington, Va.
ANALYTICAL CONSTRUCTION OF FLIGHT VEHICLE SURFACES Abstract Only c05
V. F. Snigirev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 100-102 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A functional is examined that simplifies the selection of the combined approximating functions on the interpolation node grid to account for arbitrary arrangement of the interpolation nodes. An example is presented to investigate the convergence of a numerical solution of the problem of determining the surface (spline) and parameter m(x,y). Author

N85-14958# Joint Publications Research Service, Arlington, Va.
PASSIVE STABILIZATION OF VERTICAL INSTABILITY IN TOKAMAK REACTOR Abstract Only c75
S. G. Bespoludennov, S. A. Galkin, L. M. Degtyarev, and V. I. Pistunovich *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 9 Transl. into ENGLISH from Atomnaya Energiya (Moscow), v. 56, no. 4, Apr. 1984 p 210-212 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Stabilization of fast vertical instability in a Tokamak reactor is considered, such an instability of the plasma column occurring in

the absence of active stabilizer operating through feedback. A sheath of conducting material or an array of conducting loops was proposed for this purpose. Passive stabilization on the other hand must not attenuate the neutron flux from plasma to blanket and therefore the blanket itself could serve this purpose. Here the instability problem and its solution are analyzed in the approximation of rigid displacement of the plasma column. The corresponding field equations and equation of motion are formulated in a toroidal system of coordinates, taking into account the symmetry with respect to the angular coordinate. A numerical solution has yielded the coordinates of equilibrium loops and the currents they carry. The results indicate that the first wall and the blanket with an effective electrical conductivity of 10 to 20 kS provide sufficient stabilization so as not require additional passive feedback, while aluminum loops provide active feedback with an adequate response speed of 15 to 30 ms. Author

N85-14959# Joint Publications Research Service, Arlington, Va.
SITUATIONAL PLANNING OF PRODUCTION PROCESSES IN A FLEXIBLE AUTOMATED PRODUCTION SYSTEM Abstract Only
Yu. M. Solomentsev, A. M. Basin, and S. V. Klimov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 21-22 Transl. into ENGLISH from Vestn. Mashinostr. (Moscow), no. 3, Mar. 1984 p 47-50 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The introduction of flexible automated production systems (GAPS) that reduce the number of machine tool workers and the product fabrication time also necessitates fundamentally new approaches to production process planning. A proposed situational planning system (SIP) that takes full advantage of the capabilities of GAPS is analyzed. The SIP system is a component of the automated control system for the GAPS, which in turn is subordinate to an integrated automated planning design and production engineering system. Depending on the production situation, requests are fed to the SIP system from the automated production process control system. Data on the production situation are also supplied simultaneously to the SIP system along with the request. Only the production limitations are fed into the SIP system, i.e., to the automated control system for the GAPS, where these limitations include production process limitations as well as the organizational limitations. Information on the fabrication routing and the composition of the operations is generated by the SIP system, i.e., by the automated control system for the GAPS itself in real time. Thus, both the routing and composition of an operation become flexible, while the control systems for the GAPS system becomes more intelligent. Author

N85-14960# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF SHOT-PEENING METHODS ON SURFACE QUALITY AND SERVICE LIFE OF BEARINGS Abstract Only **c37**
N. D. Kuznetsov, V. I. Volkov, and V. A. Dmitriyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 22-23 Transl. into ENGLISH from Vestn. Mashinostr. (Moscow), no. 3, Mar. 1984 p 14-17 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Since tradiational strain hardening techniques are not feasible for finishing thin-walled, low stiffness annular parts with a complex surface configuration and small structural stress concentrators in the form of fillets and grooves, hydraulic shot peening is promising for such surfaces following polishing and superfinishing. Rolling contact bearing rings were subjected to abrasive hydraulic shot-peening using steel balls 1 to 2.4 mm in diameter made of ShKh15 steel (HRC 62-66) with transformer oil used as the fluid. The bearing races were also hardened with a working mixture of distilled water with anticorrosion additives, transformer oil and microscopic steel balls. The effect of such treatment is evaluated by correlating the variations in the shot-peening apparatus parameters (working pressure at the ejector nozzle output, shot diameter, peening time) with the resulting roughness parameters, unevenness, microhardness and deviations from the correct shape. The microhardness and residual stresses in the surface layer of the internal rings of 6-32205D1 rolling contact bearings were studied with X-ray diffraction analysis. Author

N85-14961# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF PROGRAMMED MOTION CONTROL SYSTEMS Abstract Only
V. M. Besedin *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 25 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), v. 27, no. 5, May 1980 p 82-88 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The problem of digital program control for machine tools is considered from the standpoint of efficiency and its dependence on the accuracy of scan trajectories. An overlap of neighboring scan loops will decrease the effects of trajectory inaccuracy, with three algorithms of scanning possible: (1) scan time and scan rate fixed independently of the overlap ratio, but width of sweep zone depending on the overlap ratio; (2) sweep zone and scan rate fixed, but scan time increasing with larger overlap; and (3) sweep zone and scan time fixed, but scan time increasing with larger overlap. Each algorithm yields a payoff in either detection probability or scan time. The scanning process is particularized for the two most common scan trajectories: meander and rectangular spiral in a plane with the number of loops ranging typically from 2 to 8. Calculations, with the aid of a numerical table, reveal the relation between the number of possible trajectory executions and the width (variable or uniform) of the unscanned zone for any given odd or even number loops and absolute deviation of the center of the scan pattern. Author

N85-14962# Joint Publications Research Service, Arlington, Va.
DEVICE FOR MEASURING RELATIVE AXIAL EXPANSION OF TURBINE ROTOR EMPLOYING SPACE-VECTOR TRACKING METHOD Abstract Only **c07**
V. M. Kapinos, V. A. Kusenko, L. A. Zarubin, Yu. I. Zimichev, V. G. Zyuzkin, F. Ya. Lyakhov, V. Z. Paley, M. D. Tkachenko, V. D. Fesenko, and Yu. L. Khrestovoy *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 27 Transl. into ENGLISH from Elektr. Stantsii (Moscow), no. 3, Mar. 1984 p 27-29 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A device for measuring the relative axial expansion of turbine rotors is described that overcomes the deficiencies of the devices now in use and has good metrological properties. The parameters of the device are analyzed through laboratory tests that indicate its suitability for new as well as existing turbines. Author

N85-14963# Joint Publications Research Service, Arlington, Va.
USE OF LEAST-SQUARES METHOD FOR ESTIMATING ERRORS OF TURBINE BLADE TYPE PARTS DURING FABRICATION Abstract Only **c07**
O. D. Khlopotov, I. S. Bochkov, Ye. S. Skorodumova, and L. M. Trifonov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 27 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 102-104 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The least squares method is applied to ensure that the accuracy of turbine blades and similarly shaped articles is in accordance with existing standards for the deviation of linear and singular dimensions, and that the position of each section with respect to the base employed is precise. Author

N85-14964# Joint Publications Research Service, Arlington, Va.
PREDICTING CHANGES IN RELIABILITY CHARACTERISTICS OF GAS TURBINE ENGINES DURING OPERATION Abstract Only **c07**
V. P. Cheprasov and Ye. Ts. Vulikh *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 28 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 68-72 Previously announced in

IAA as A84-30420 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

An approach is outlined to solving the problem of diagnosing the condition of mass produced gas turbine engines and predicting the changes that occur from use. It is pointed out that calculations at present rely on two assumptions. The first is that the law governing the distribution of times during which the engines operate without failure is exponential. The second is that all the engines are of uniform reliability. It is shown that models incorporating these assumptions can be improved by modifying the first assumption. The approach outlined involves an analysis of the conditional probabilities of failure occurrence. C.R. (IAA)

N85-14965# Joint Publications Research Service, Arlington, Va.
OPTIMUM THERMOGASDYNAMIC DESIGN OF GAS TURBINE ENGINES BY CHARACTERISTICS OF ELEMENT PROTOTYPES Abstract Only c07
Yu. V. Kozhevnikov, V. O. Borovik, V. S. Ivanov, V. A. Talyzin, I. N. Agliullin, and Yu. V. Meluzov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 28 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Formulas are derived to provide graphic approximations of assigned characteristics of components including low and high pressure compressors and blowers. The parameters of a two stage aircraft engine are optimized. Author

N85-14966# Joint Publications Research Service, Arlington, Va.
LONGEVITY OF THIN-WALLED ENGINE PARTS SUBJECTED TO TRANSIENT STRESSES UNDER CREEP CONDITIONS Abstract Only c07
A. F. Gurov, V. D. Tokarev, and V. A. Komkov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 28 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 31-35 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The longevity of a part subjected to monotonically increasing stress from zero to breakdown is examined. Formulas are derived to describe the vulnerability and longevity of thin walled structural members under varying conditions of monotonically increasing stress. Author

N85-14967# Joint Publications Research Service, Arlington, Va.
RANDOM VIBRATIONS OF AIRCRAFT ENGINE BLADES Abstract Only c07
A. D. Gershgorin and M. L. Kempner *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 29 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 1, Jan. 1984 p 65-67 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A simple model of an aircraft engine blade with long stem and dry friction damping is considered for analysis of flexural vibrations in the plane of rotation under a dynamic load. The blade is treated as a cantilever beam, its mass is lumped at the free end, and the dynamic load is replaced by a centrifugal force acting at the free end as a stationary centered random process. The corresponding equations of motion are solved by the method of statistical linearization, which yields the mean value and the dispersion of flexural stress. Calculations are done for the special case of a blade with uniform stiffness and a white noise perturbation force with infinite spectrum. First considered is a blade without damper and thus motion with one degree of freedom, then a blade with damper at the center and thus motion with two degrees of freedom. In the latter variant the damper is assumed to have a lumped mass equal to that of the blade. The results indicate ways to optimize the damping of random blade vibrations. R.J.F.

N85-14968# Joint Publications Research Service, Arlington, Va.
TERMINAL CONTROL OF GLIDING IN ATMOSPHERE Abstract Only c08
V. A. Afanasyev and T. K. Sirazetnivov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 30 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 5, Oct.-Dec. 1983 p 3-9 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The problem of controlling gliding of a flight vehicle entering the atmosphere at near circular velocity and landing at a specified point on the ground is examined. Control is accomplished by changing the angular orientation of the flight vehicle by the moments of the forces created by the engines and applied perpendicular to the longitudinal axis. Changing the angular orientation of a flight vehicle changes the trajectory of its center of mass. An example of the simplified control problem is presented in which crude assumptions are refined through iterative synthesis of the control force. R.J.F.

N85-14969# Joint Publications Research Service, Arlington, Va.
DESIGN OF TWO-MIRROR SCANNER WITH AXES OF ROTATION NOT IN PLANE OF MIRRORS Abstract Only c74
Ye. I. Antonov, A. Tkachev, and V. V. Ridiger *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 31 Transl. into ENGLISH from Optiko-Mekhan. Prom. (Leningrad), no. 2, Feb. 1984 p 29-31 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Design equations are derived for a pair of rotating wedge as scanner mirrors. Any spiral or rosette trajectory of the light spot can be achieved with the proper speed ratio and senses of rotation. Aberration, caused mainly by chromatism, is eliminated by rotating the mirrors about axes not in their plane but parallel to one another. Calculations are shown for a typical configuration in a stationary in a stationary reference system of Cartesian coordinates. The light path with reflections and the light spot trajectory on the target are calculated by the matrix method, assuming that each wedge constitutes a plane mirror. A spiral trajectory inscribes an elliptical field with variable pitch when the speed ratio C lies with he $1 < C < 2$ range, but the field approaches a circular one as the angle between light path and axes of rotation increases. The maximum pitch of the spiral trajectory and the alloable divergence angle of the light beam each determine the other, both also depending on the speed ratio. Design and performance calculations made on a Besm-6 high-speed computer are shown for $C = 1.05$ and $C = 1.3$ with a theta = 0.66' angle between the axes of rotation and normals to the mirror surfaces. R.J.F.

N85-14970# Joint Publications Research Service, Arlington, Va.
EFFECT OF ABERRATION IN OPTICAL SYSTEM ON ILLUMINANCE DISTRIBUTION OVER IMAGE OF STRIP IN SEMICOHERENT LIGHT Abstract Only c74
I. V. Peysakhson and N. M. Maltsev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 31-32 Transl. into ENGLISH from Optiko-Mekhan. Prom. (Leningrad), no. 2, Feb. 1984 p 27-29 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The effect of third-order aberration on the image of a transparent strip is analyzed systematically, characteristics of this aberration being indicators of technological imprecision and errors. The analysis involves a comparative evaluation of illuminance profiles corresponding to various degrees of noncoherence. Calculations are shown for condenser and objective lenses in circular frames, assuming a uniform luminosity of the condenser pupil. They are based on Hopkins relations. Both wave aberration and spherical aberration are considered, coma, astigmatism, and defocusing being determined in each case. The results reveal that coma with its axis of symmetry parallel to the image axis causes least widening of the image, while defocusing is determined in each case. The results reveal that coma with its axis of symmetry not parallel to the image axis produces an asymmetry of the illuminance profile, with maximum illuminance shifting away from the center as the angle between coma axis and image axis increases from 0 toward 90 deg. R.J.F.

N85-14971# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF PARAMETERS DEFINING ORIENTATION OF LIQUID CRYSTALS IN ELECTROOPTIC CELLS Abstract Only **c76**
V. A. Korzhenevskiy, V. I. Lebedev, S. A. Levichev, and M. G. Timilin *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 32 Transl. into ENGLISH from Optiko-Mekhan. Prom. (Leningrad), no. 2, Feb. 1984 p 19-21 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Liquid crystals with smooth nonoriented surfaces have either homeotropic or planar orientation, depending on whether their surface tension is respectively larger or smaller than the critical surface tension of the substrate. An experimental method of determining both parameters was developed for the purpose of predicting the orientation of real crystals with nonideal surfaces. The surface tension of the liquid crystals is determined from measurement of the distance x between two pointson the meniscus far from the container wall that correspond to two distinctly different reflection angles. The instrumentation for this measurement includes a laser source, a mirror, a diaphragm, a lens, and a movable stage with micrometer screw. The critical surface tension of the substrate is determined from measurement of the force acting on a thin plate coated with the orientant material and originally edgewise immersed in a nonpolar reference liquid as this plate separates from the free surface of that liquid upon being pulled out, and measurement of the interphase tension minus free adhesion at that instant. R.J.F.

N85-14972# Joint Publications Research Service, Arlington, Va.
RESONANT SCATTERING OF ACOUSTIC WAVES BY ELASTIC SPHERICAL SHELL IN FLUID Abstract Only **c71**
A: P. Poddubnyak *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 38 Transl. into ENGLISH from Akust. Zhurnal (Moscow), v. 30, no. 1, Jan.-Feb. 1984 p 89-95 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The theory of resonant acoustic scattering is employed to examine the fine structure of the spectrum of echo signals reradiated by a thin elastic hollow spherical shell. Comparative numerical analysis confirms the applicability of the theory of Timoshenko-type shells in steady-state and transient modes for a wide range of variation of the wave parameters of a thin-walled object. The explicit analytical formulas derived for resonant parameters using the R-matrix approach makes it possible to understand the mechanism underlying the formation and structure of reradiated signals. R.J.F.

N85-14973# Joint Publications Research Service, Arlington, Va.
DISPERSION CURVES FOR NORMAL WAVES IN CYLINDRICAL SHELL AND CONDITIONS FOR SPATIAL COINCIDENCE IN VICINITY OF CRITICAL FREQUENCIES Abstract Only **c34**
V. V. Muzychenko, A. P. Paniklenko and S. A. Rybak *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 39 Transl. into ENGLISH from Akust. Zh. (Moscow), v. 30, no. 1, Jan.-Feb. 1984 p 83-88 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The eigenfrequency spectrum of a cylindrical shell with incident plane wave in a liquid is analyzed. The behavior of the dispersion curves for normal waves in an infinite thin cylindrical shell is examined. The spatial coincidence conditions are analyzed for quasi-flexural, quasi-shear and quasi-longitudinal waves occurring with incidence of a plane acoustic wave at an arbitrary angle. Analytical expressions are derived for the frequencies and angles of spatial coincidence in the vicinity of the critical frequencies of the shell. R.J.F.

N85-14974# Joint Publications Research Service, Arlington, Va.
AERODYNAMIC AND THERMAL CHARACTERISTICS OF STELLATE BODIES IN HYPERSONIC FLOW OF RAREFIED GAS AT ANGLE OF ATTACK Abstract Only **c02**
A. I. Bunimovich and V. I. Kuzmenko *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 39 Transl. into ENGLISH from Vestn. Mosk. Univ. Ser. 1: Mat., Mekhan. (Moscow), no. 2, Mar.-Apr. 1984 p 74-77 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The aerodynamic and thermal characteristics of stellate bodies are assessed for varying members of rays, relative thickness, flight altitude and angle of attack. Graphs are developed that can be used to select the optimum configuration for a specific problem. R.J.F.

N85-14975# Joint Publications Research Service, Arlington, Va.
INTENSIFICATION OF CONVECTIVE HEAT TRANSFER BY MEANS OF ARTIFICIAL SURFACE ROUGHNESS Abstract Only **c34**
A. A. Zhukauskas *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 40 Transl. into ENGLISH from Teploenergetika (Moscow), no. 3, Mar. 1984 p 10-14 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Artificial roughness is considered as passive means of intensifying convective heat transfer from a wall to a turbulent stream, intensification in this case being a consequence of a boundary layer with lower thermal resistance rather than of a larger effective surface area. The mechanism is analyzed on the basis of velocity profiles through the laminar sublayer, the transitional interlayer, and the logarithmic turbulent core. The velocity profiles are obtained from the solution of the corresponding equation of one-dimensional heat transfer, taking into account total as well as molecular heat conduction. Theoretical and experimental data on plates and pipes with cooling air, water, or transformer oil were evaluated in terms of the Nusselt number as function of both the Reynolds number and the Prandtl number and with the velocity of the stream normalized to a characteristic parameter with the dimension of velocity: square root of the ratio of shearing stress to density. In the case of pipes, inside and outside cooling were considered. The results indicate how the roughness characteristics, namely surface profile and asperity height, and the Prandtl number at fixed values of the Reynolds number can be optimized for maximum heat transfer intensity. R.J.F.

N85-14976# Joint Publications Research Service, Arlington, Va.
TRANSONIC FLOW OF ELASTIC MEDIUM PAST SLENDER SOLID BODY Abstract Only **c02**
I. V. Simonov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 40-41 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 1, Jan.-Feb. 1984 p 114-122 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Frictionless transonic flow of a boundless elastic medium past a perfectly rigid slender flat solid, a blade of symmetric cross section and finite length L, is analyzed in terms of velocity and stress fields. The boundary conditions are zero transverse displacement before the blade tip, zero transverse stress behind the blade base, and zero shearing stress throughout. Also stipulated are nonseparation flow without tensile stress along the blade surface, separation occurring at the base joint without intersection of the cavity wall in the wake and the blade contour behind the separation. The blade profile is assumed to widen monotonically from tip to base and the energy density within any finite volume of the fluid medium is assumed to be integrable. The condition of radiation is added as another constraint. The corresponding two-dimensional steady-state problem is formulated in accordance with the theory of elasticity, with displacements expressed through potentials. R.J.E.

N85-14977# Joint Publications Research Service, Arlington, Va.
STABILITY OF LUBRICANT FILM IN GAS DYNAMIC BEARING Abstract Only **c37**
B. A. Arefyev, K. I. Gulyayev, and N. B. Talaykova *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 41 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), v. 27, no. 5, May 1984 p 63-68 (For

primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The stability of a gas stream between two cylindrical rotating surfaces, one inside the other, is analyzed from the standpoint of a gas dynamic bearings. Particularly important is consideration of flow of a thin lubricant film with a low Reynolds number. The corresponding differential equation for the circumferential pressue distribution is formulated in a polar system of coordinates fixed to and rotating with the shaft so that the pressure on the shaft as well as the angular coordinate of a stationary point of the bearing become periodic functions of time. The equations of state for the lubricant film remain conventional in form, with the angular coordinate corresponding changed to the product of time by the constant angular velocity. The problem is solved upon introduction and evaluation of the characteristic index containing an integral resolvable into two parts. The first part is always positive and has always a destabilizing effect. Only the second part, which depends on the shaft eccentricity and the pressure distribution function, can contribute to stability of the lubricant film. R.J.F.

N85-14978# Joint Publications Research Service, Arlington, Va.
LINEAR PROBLEM OF HARMONIC VIBRATOR ACTING AT SUPERCRITICAL FREQUENCIES IN SUBSONIC BOUNDARY LAYER Abstract Only c02
Ye. D. Terentyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 42 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 264-272 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A quiescent rectangular plate with transition to a harmonically vibrating triangular end piece and with thermal insulation on all surfaces is immersed in a subsonic gas stream. The flow along the surface is describable by equations of a boundary layer with self-induced pressure. R.J.F.

N85-14979# Joint Publications Research Service, Arlington, Va.
HYPERSONIC FLOW OF MIXTURE AROUND BLUNT BODY Abstract Only c02
A. Ya. Sagomonyan *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 43 Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. 1: Mat. i Mekhan. (Moscow), no. 3, May-Jun. 1984 p 54-62 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

Hypersonic flow of a mixture around a blunt body is treated in the irrotational approximation, by extending the Lighthill method of solution for a homogeneous incompressible fluid behind the shock wave front to a compressible two-phase mixture. A symmetric body such as a sphere is considered in an original velocity of sound. The mixture is a thermodynamically ideal gas containing solid particles or liquid drops in suspension. The corresponding two dimensional equations of motion for this centrisymmetric problem are formulated in a polar system of coordinates with the origin at the center of the sphere and with the equation of state of the suspended phase given, disregarding any phases transformation of the suspended substance such as evaporation of liquid in the wave. These equations are solved for distributions of tangential and radial velocity and gas pressure and particle concentration in and behind the wave, with appropriate boundary conditions stipulated at the surface. The pressure of the mixture at the stagnation point on the body, at the bow point of the wave, and at the gas stream splitting point between the other two is calculated by the Bernoulli integral. A method of solution is outlined for vortical hypersonic flow, thermodynamic relations being used for prior determination of the vorticity of each phase in the spherical bow shock wave. E.A.K.

N85-14980# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF COMPLEX INTERACTION OF SHELL OF REVOLUTION AND ITS FILLER WITH ALLOWANCE FOR FRICTION Abstract Only c34
V. F. Maksimov and A. B. Kiselev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 44 Transl. into ENGLISH from Vestn. Mos. Univ. Ser. 1: Mat., Mekhan. (Moscow), no. 2, Mar.-Apr. 1984 p 85-89 Previously announced as A84-31770 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The study continues with the work reported by Maksimov and Kiselev (1982). A numerical method is proposed to determine the interaction between the shell and the filler. The method allows the solution of the contact problem in such a way that it enables of the occurrence and interruption of contact at the surface, the possibility of slipping and friction at the surface of contact which is defined in the process of problem solving. It is found that friction between the shell and the filler has a much greater effect on the stress-strain state of the filler than on the shell. Author

N85-14981# Joint Publications Research Service, Arlington, Va.
VARIABLE LOADING OF ELASTIC-PLASTIC SHELLS OF REVOLUTION Abstract Only c39
S. I. Tarakanov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 44 Transl. into ENGLISH from Vestn. Mosk. Univ. Ser. 1: Mat., Mekkan. (Moscow), no. 2, Mar.-Apr. 1984 p 67-71 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

axisymmetrical loaded shells of revolution in which the median surface is formed by rotating a smooth curve about some axis were examined. The Kirchoff-Love hypotheses were used to derive the basic formulas. The deformation and changes in curvature of the median surface of the shell which occur during loading are examined by the dynamic relaxation method. A closed cylindrical shell with constant thickness with variable loading is studied. E.A.K.

N85-14982# Joint Publications Research Service, Arlington, Va.
STABILITY OF CIRCULAR CYLINDRICAL SHELL WITH PIECEWISE CONSTANT THICKNESS SUBJECTED TO RADIAL PRESSURE Abstract Only c39
Ye. A. Prokopyev and V. A. Ryabtsev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 45 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 97-100 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A method to solve problems of shell stability with stepwise varying thickness, which are easier to fabricate than shells with continuous change in thickness is proposed. The proposed method is used to solve stability problems of three shells subjected to constant radial pressure. The problem of the stability of an edge articulated shell subjected to an external annular radial load is also solved. E.A.K.

N85-14983# Joint Publications Research Service, Arlington, Va.
STRENGTH ANALYSIS OF FAN-SHAPED WING CONSIDERING TEMPERATURE DEFORMATION AND CREEP DEFORMATIONS Abstract Only c05
Yu. A. Kashfraziyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 45 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 85-88 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The supporting surface of a flight vehicle with a fan arrangement of the longerons was examined. The stress-strain state of such structures is determined with allowance for the influence of temperature deformations and creep deformations. Creep is found to cause substantial redistribution of stresses in the strength members, as well as the accumulation of residual deformations that can cause premature failure of supporting surfaces. E.A.K.

N85-14984# Joint Publications Research Service, Arlington, Va.
DEFORMATION OF CYLINDRICAL SHELL WITH CANTILEVERED ELASTIC PLATES ATTACHED Abstract Only c39
B. A. Antufyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 46 Transl. into ENGLISH from

Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 80-82 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

An approximate solution for the problem of the deformation of a thin elastic smooth cylindrical shell of finite length with two cantilevered elastic trapezoidal plates of variable thickness affixed was examined. The problem is solved by dividing the shell into two identical panels and examining one of them. A numerical example of a uniformly stressed shell is presented. E.A.K.

N85-14985# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF THIN-WALLED AIRFRAME MEMBERS IN GEOMETRICALLY NONLINEAR STATEMENT Abstract Only c05
V. A. Pavlov and A. S. Safonov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 46 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 52-56 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A geometrically nonlinear analytical theory is developed that allows the influence of axial shifting on the stress-strain state of a structure to be assessed. A proposed theory is extended to include geometrically nonlinear problems. Nonlinear integral differential matrix equations are derived for determining the stress-strain state of a thin walled structure with allowance for geometric nonlinearity. E.A.K.

N85-14986# Joint Publications Research Service, Arlington, Va.
STABILITY OF HOLLOW SHAFTS UNDER TORSION Abstract Only c39
V. I. Alekseyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 48 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 1, Jan. 1984 p 58-62 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The static load capacity of smooth hollow shafts under torsion was evaluated. It is considered that it depends on the resistance to plastic deformation and can be much lower than under plain shear. The critical stresses are calculated by the theory of thin cylindrical shells, on the basis of the physical state of stress and strain at the elastic limit. Certain coefficients and exponents in the resulting relations are empirical, their values was determined for two grades of steel: EI961 silicon steel and 38Kh8MYuASh chromium steel. Calculations by this method yield higher critical loads than indicated by measurements. The results are applicable to tubular torsion springs and to hollow rotating shafts, smooth or slotted, under axial loads in addition to centrifugal forces. E.A.K.

N85-14987# Joint Publications Research Service, Arlington, Va.
SAINT VENANT CONDITIONS IN THEORY OF PIEZOELASTIC SHELLS Abstract Only c39
N. N. Rogacheva *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 48-49 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 302-306 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The equations of piezoceramic shells and of corresponding boundary layers are formulated in a triorthogonal system of coordinates, two curvilinear axes constituting respective lines of curvature of the median surface and one rectiliner axis normal to both. After the coordinates have been stretched in the direction of maximum change in variables calculation of the boundary layer reduces to solution of a plane problem and an antiplane one for a piezoceramic half-strip with homogeneous boundary conditions at the faces. It is assumed that arbitrary electrical and mechanical loads at the free edge of a half-strip. The Saint Venant principle to elastic shells under both electrical and mechanical loads at the edge is extended: while in a plain elastic shell a not self-balanced mechanical load produces a stressed-strained state that decays at the edge, in a piezoceramic shell an electrical load at the edge, whether self balanced or not, produces an electroelastic state that decays exponentially with increasing distance from the edge. Only electrical and mechanical loads are considered in calculations of the internal stressed-strained state. E.A.K.

N85-14988# Joint Publications Research Service, Arlington, Va.
CONTROLLABLE ROTATION OF SYSTEM OF TWO SOLID BODIES WITH ELASTIC ELEMENTS Abstract Only c70
V. Ye. Berbyuk *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 49 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 238-246 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

A mechanical system that consists of two solid bodies connected through an elastic bar of variable cross section is considered. This bar is at one end coupled to the carrier body by a weightless spring constituting a hinge joint and simulating an elastic fastener, at the other end it is rigidly clamped to the rider body of dimensions much smaller than the length of the bar. The system rotates in some plane and this is evaluated for controllability. The analysis is based on the linear theory of inextensible slender straight beams, with the equations of motion formulated by the Hamilton-Ostrogradskiy variational principle. Kinetic energy and potential energy are expressed with second order precision, the radius-vector and the relative velocity of any point along the bar and the angular velocity of the system are expressed in the linear approximation with respect to additional angular displacement owing to compliance of the hinge joint. Boundary and initial conditions are stipulated for the resulting system of integro-differential equations, for subsequent controllability analysis. This analysis in the quasistatic approximation is followed by an analysis for a bar with high flexural stiffness and infinitely high flexural stiffness limiting case. E.A.K.

N85-14989# Joint Publications Research Service, Arlington, Va.
MOTION OF HEAVY SYMMETRIC BODY WITH FLEXIBLE BARS ABOUT STATIONARY POINT Abstract Only c70
V. G. Vilke *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 50 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 233-237 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The motion of a symmetric solid body about its center of mass was analyzed. The body has two pairs of collinear identical bars attached to it in quadrature along the principal axes in the equatorial plane of the ellipsoid of inertia. The deflection of the bars is calculated from the kinetic energy and the momentum of the system, using the Routh functional and applying the theory of flexure for viscoelastic slender straight beams. After a change from canonical to Andoyer variables, the corresponding equatins are solved for appropriate kinematic and dynamic boundary conditions, with dissipation forces represented as those of linear viscous internal friction. The solutions for undeformable stiff bars describe regular precession of an Euler body. The solutions for slightly flexible bars with small strain describe damped forced vibrations of such bars. A transient and stability analysis of the angular momentum vector by the method of averaging, under constraints which validity of this method imposes on the moments of inertia, indicates that motion of the system evolves approaching steady rotation about the vertical axis. E.A.K.

N85-14990# Joint Publications Research Service, Arlington, Va.
TESTING THE ANTIFRICTION PROPERTIES OF ALLOYS FOR HEAVILY LOADED BEARINGS Abstract Only c37
P. I. Yamshanov and V. V. Lebedeva *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 51 Transl. into ENGLISH from Vestn. Mashinostr. (Moscow), no. 3, Mar. 1984 p 21-23 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

The antifriction properties of bearing alloys were studied. The wear and strength of different alloys were evaluated for severe conditions. The most suitable for the fabrication of heavily loaded bearings are tin-lead and tin-phosphorus bronzes. Bronzes and brass without tin do not meet the high load antifriction and antiseizing criteria. The method can also be employed for the

development of new alloys for heavily loaded bearings and to study the mechanism of friction and wear for real loads and slip rates. E.A.K.

N85-14991# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING
26 Sep. 1984 69 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UEE-84-012) Avail: NTIS HC A04

News items, abstracts and articles of scientific reports on aspects of electronics and electrical engineering including antennas and propagation, broadcasting/consumer electronics, communications, computers, electrical insulation, instruments and measurements, power engineering, microwae theory and techniques, quantum electronics/electro-optics, sonics and ultrasonics, and solid state circuits are contained. For individual titles, see N85-14992 through N85-15041.

N85-14992# Joint Publications Research Service, Arlington, Va.
APERTURE SYNTHESIS FOR RADIOASTRONOMY Abstract Only c89
Yu. N. Pariyskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1319-1322 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Aperture synthesis for radioastronomy and measurement of large radiating sources is only partially developed in the USSR, examples being two-element interferometry in the Crimean Astrophysical Observatory, an ocean interferometer, variable-base synthesis of the Sun's image, and beginning of the construction of a giant cross at the Institute of Physics (USSR Academy of Sciences). No operational radiotelescope is yet available for aperture synthesis, the RATAN-600 doing only a limited job in this area. A school for aperture synthesis was established and organized at the Scientific Research Institute of Radiophysics in Gorkiy, for experimental studies on an aperture network with participation of at least four other scientific institutions and for tie-in with European and global networks. In addition to mere acquisition of huge data, there are also developed methods of space communication and data processing. Particularly emphasized are promising digital communication systems, optical and hybrid date processing, extensive use of field-effect transistors in high-sensitivity low-noise receiving and measuring devices, and holography with Fourier transformation. B.G.

N85-14993# Joint Publications Research Service, Arlington, Va.
PLACE OF APERTURE SYNTHESIS IN GENERAL THEORY OF ANTENNAS (REVIEW) Abstract Only c32
L. D. Bakhrakh and O. S. Litvinov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1323-1334 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Antennas with aperture synthesis belong in the class of antennas with signal processing, by pulse-time modulation with subsequent filtration, by multiplication of several signals or raising one signal to a power, by selfphasing with subsequent summation through feedback or sequential summation with time delays, or by adaptation. A major problem in any of these methods of processing is establishing equivalence of the contour current and the continuous antenna aperture with respect to the radiation pattern. Solution of this problem involves correlational analysis and optimal weighting, taking into account diffraction and usually assuming additive Gaussian noise mixtures. Moreover, adaptive processing of data in aperture synthesis systems features, automatic suppression of strong interference, automatic phasing of antenna arrays, and boosting the resolution in a given direction. Such an adaptive processing in aperture synthesis systems with immunization of the useful signals is in no way related to signal processing in superdirectional radar antennas. Author

N85-14994# Joint Publications Research Service, Arlington, Va.
METHOD OF APERTURE SYNTHESIS: FUNDAMENTAL RELATIONS AND DATA PROCESSING IN APERTURE SYNTHESIS SYSTEMS (REVIEW) Abstract Only c32
V. I. Turchin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 2-3 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1335-1344 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The theory of aperture synthesis for solution of astrophysical problems regarding the structure of radiation sources is based on the time correlation function for signals from space-diverse receiver elements. This correlation function is approximately equal to the product of the surface integral of the filter frequency characteristic times the sought radioluminance (power flux density) distribution of respect to angle. In the Fourier transform domain the radioluminance distribution is the product of the antenna space-frequency characteristic and the space-coherence function. The mathematical procedure for aperture synthesis reduces to calculation of the radioluminance distribution as such. Conventional linear methods of data analysis and processing for this purpose include cleaning of large side lobes by sequential suppression of strong sources so as to reveal otherwise masked weak sources. Recently there were conceived other methods, namely: (1) using a priori information about the source dimensions; (2) utilizing the positive-definiteness of the coherence function; discretization and composition of the radioluminance distribution with adaptation of its elements relative to location. Author

N85-14995# Joint Publications Research Service, Arlington, Va.
APERTURE SYNTHESIS (REVIEW) Abstract Only c32
L. R. Kogan and L. I. Matveyenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 3 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1345-1356 Original language doc. previously announced in IAA as A84-20804 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The theoretical principles underlying the synthetic-aperture technique are presented with reference to the use of this technique in radio astronomy. Attention is given to image distortion due to the imperfect coverage of the U. V plane; and to the problem of calibration in VLBI. Methods for the reconstruction of the source-brightness distribution in VLBI are examined, including the method of model aproximations, the method of closed phases, the method of closed amplitudes, and the construction of images of line-emitting sources (masers). B.J. (IAA)

N85-14996# Joint Publications Research Service, Arlington, Va.
INTERFEROMETRY WITH DECAMETRIC WAVES (REVIEW) Abstract Only c32
V. P. Bovkun and A. V. Men *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1357-1370 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Very-long-baseline interferometers are now used for astrophysical high-frequency observations and measurements using centimetric and metric waves. Interferometry with decametric waves would be more suitable for exploration of regions with small angular dimensions or with steep spectra such as found in stellar relicts, at frequencies below 50 MHz. Use of decametric waves is still problematic, however, because of the terrestrial ionosphere which influences long-wave interferometry through the mechanisms of Faraday rotation, phase shift, and flicker. These effects were studied and their magnitudes measured with a URAN-1 interferometer using the north-south antenna array of a UTR-2 radiotelescope. On the basis of the data and their statistical analysis, procedures

for measuring the visibility function of sources with shorter waves were modified for use of longer waves. Radioemission from Jupiter and the nebula in Cancer served as most suitable objects for developing and testing these procedures. Author

N85-14997# Joint Publications Research Service, Arlington, Va.
MODERN RADIOASTRONOMICAL APERTURE SYNTHESIS SYSTEMS (REVIEW) Abstract Only c89
N. M. Tseytlin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1360-1393 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Although sequential aperture synthesis is based on an analogy to synthesis of antenna arrays it is not adequate for analysis of signals and radioluminance distributions which vary during movement of the antennas. Parallel aperture synthesis is performed by an interferometer with fixed antennas so that not only stationary processes but also transient ones can be simultaneously observed. The aperture synthesis systems now in worldwide use can be broadly classified into cross radiotelescopes and T-radiotelescopes consisting of linear antenna arrays, multielement radiotelescopes with fixed antennas, multielement radiotelescopes with fixed and movalbe antennas, and millimetric-wave interferometers. B.G.

N85-14998# Joint Publications Research Service, Arlington, Va.
METRIC-WAVE AND DECIMETRIC-WAVE APERTURE SYNTHESIS SYSTEMS (REVIEW) Abstract Only c32
Yu. P. Ilyasov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1394-1402 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Aperture synthesis systems using metric or decimetric waves are adequate and promising for astrophysical study of extragalactic radioemission sources, operation with metric waves being characterized by destabilizing effects of the ionosphere and thus requiring special methods of data processing. Methods of closure phase and closure amplitude were proposed and then successfully implemented in very-large-baseline radiotelescope and multi-element interferometers, respectively. Several radiotelescopes were developed which operate in the supersynthesis mode, with rotation of the Earth used for filling the space-frequency plane. Further achievements include the Swarup system (Uti/INDIA) with phase-stable interferometer, the Jodrell Bank system (Manchester/UK), the Palmer Merlin multielement system (UK) with CLEAN procedure and CORTEL telescope correction algorithm, the VLA system (USA), and the international giant equatorial radiotelescope. Author

N85-14999# Joint Publications Research Service, Arlington, Va.
CROSS-SHAPED APERTURE SYNTHESIS SYSTEM Abstract Only c32
G. Ya. Smolkov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 5-6 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1403-1419 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A radiotelescope with a cross-shaped parallel-sequential aperture synthesis system is being installed in Siberia for the purpose of radioheliographic research, particularly for study of solar active regions and bursts. The design of this facility takes into account peculiarities of the Sun as a radioemission source, namely its continuous and sometimes fast as well as wide variation, sudden buildup of new activity, diversity of processes and formations, wavelength dependence of the extent of activity spread, nonuniform large-scale and small-scale structure, and effect of the Sun's rotation on location and form of observable objects. In order to cope with solar dynamics, it was foremost necessary to ensure an angle resolution adequate for visible and X-ray images by appropriate spacing of antenna arrays over a large area. With an attainable resolution of 10 inches x 20 inches, it is possible to synthesize 35 feet by 35 feet radio images of the solar disk with centimetric waves. Author

N85-15000# Joint Publications Research Service, Arlington, Va.
DECIMETRIC-WAVE APERTURE SYNTHESIS SYSTEM AT SCIENTIFIC RESEARCH INSTITUTE OF RADIOPHYSICS Abstract Only c32
V. S. Beagon, N. A. Dugin, A. A. Romanychev, L. R. Semenova, V. I. Turchin, and N. M. Tseytlin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 6-7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1420-1427 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Development and design of the decimetric-wave aperture synthesis began in 1970; installation was completed and operation began in 1979. The main element is a two-antenna (D= 7 m) interferometer with fixed baseline length (417 m) for operation at the 56-cm wavelength in the supersynthesis mode, utilizing the Earth's rotation. The other basic components, developed and produced in various stages of the project, are a receiver complex, a communication link and phase calibration system, and an automatic measuring and data processing system with an Elektronika D3-28 microcomputer. The receiver complex consists of a hybrid superheterodyne with phase-lock automatic frequency control and two frequency converters, a single-sideband one and a double-sideband one. The first converter consists of high-frequency stages, is followed by a balancing mixer and an intermediate-frequency (60 + or - 10 MHz) preamplifier. The second converter is an ampliphase meter. The facility also contains equipment for digital processing of data and equipment for interferometer operation control, including antenna drives and monitor. B.G.

N85-15001# Joint Publications Research Service, Arlington, Va.
APPARATUS OF SHORT BASELINE CENTRIMETRIC WAVE RADIOINTERFEROMETER WITH CABLE COMMUNICATION LINES FOR ASTROPHYSICAL RESEARCH Abstract Only c89
V. A. Alekseyev, A. Ye. Kryukov, B. N. Lipatov, and A. S. Sizov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1428-1436 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Using the very-long-baseline astrometric radiointerferometer at the Scientific-Research Institute of Radiophysics as a model and reference, a short-baseline decimetric-wave radiointerferometer with scale communication lines between antennas was developed and designed for measuring the modulus of the visibility function of radioemission sources. Operation of this radiointerferometer was checked first in the laboratory and then in the field against several extraterrestrial radioemission sources (3C 273, Cygnus-A). Although the peak of the interferometer response curve is generally a function of delay time and interference frequency, here the correlational envelope of received radioemission represents the radiation pattern with respect to time delay and is such that it increases the noise immunity of the system by suppressing wideband correlational noise at the instant of observation. Fourier analysis of interference fluctuations with high spectral resolution in real time does, furthermore, facilitate discrimination of the useful signal from correlational noise. It is also possible here to attain very long periods of coherent pickup, necessary for measurement of power fluxes from sources which are regarded as point sources relative to the baseline. B.G.

N85-15002# Joint Publications Research Service, Arlington, Va.
PHASE PROBLEM IN APERTURE SYNTHESIS SYSTEMS Abstract Only c33
M. V. Konyukov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1437-1447 (For primary document see

N85-14991 06-31)
Avail: NTIS HC A04

Synthesizing radioluminance distributions from phase-perturbed Fourier transforms, until now an ill-conditioned and therefore unsolvable problem without additional information, has become solvable inasumch as radio-luminance distributions are found to be finite functions of space coordinates with carrier regions existing where these functions are zero and inasmuch as the response of a narrow-band interferometer yields phase-perturbed Fourier transforms without loss of all information. Furthermore, with more than three antennas, phase information is available in the form of closure relations. The conditions under which this phase problem is solved for an aperture synthesis system are now established on the basis of actual observations and theoretical analysis, considering two fundamentally different cases: determining the distribution function f(x) from its phase-perturbed Fourier transform, and the transformation being linear. Author

N85-15003# Joint Publications Research Service, Arlington, Va.
APPROXIMATING TRUE RADIOLUMINANCE DISTRIBUTION FROM OBSERVATIONS ON APERTURE SYNTHESIS SYSTEMS Abstract Only **c89**
M. V. Konyukov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 8-9 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1448-1456 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

One of the fundamental problems in radioastronomy, namely producing a radioluminance distribution from observations on an aperture synthesis system with Fourier transformation, cannot be solved exactly in the case of an arbitrary distribution function about which a real aperture synthesis system yields incomplete information, so that it is not possible to obtain its Fourier transform. It is therefore solved approximately, considering that a distribution of radioluminance is one of points on a unit sphere and can, under certain conditions, be regarded as a function of only two Cartesian coordinates with a rectangular region of definition and as zero outside this region. One deficiency of classical data processing here, namely unremovable deviations of the function in the case of holes inside the region of definition, is overcome by a nonclassical method based on solution of the problem of moments in the large sense. This method reduces the problem of radioluminance distribution to finding the linear functional of a numerical sequence and solves it uniquely with fundamentality of the set as a necessary and sufficient condition. Author

N85-15004# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF RADIO IMAGE ON RATAN-600 RADIOTELESCOPE Abstract Only **c89**
B. S. Minchenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 9-10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1463-1471 Original language doc. previously announced in IAA as A84-20815 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Algorithms are proposed for constructing radio maps of sources observed with the RATAN-600 using azimuthal aperture synthesis in the case of knife-beam and arbitrary patterns. Attention is given to such details of the procedure as scan correction, spectrum interpolation, the cleaning of the synthesized image, the discrete synthesis of partial maps, and evaluation of image quality. Examples of synthesized images are presented. B.J. (IAA)

N85-15005# Joint Publications Research Service, Arlington, Va.
ATTEMPTS TO CONTRUCT TWO-DIMENSIONAL IMAGE OF SUN FROM OBSERVATIONS MADE WITH RATAN-600 RADIOTELESCOPE BY RELAY RACE METHOD Abstract Only **c89**
O. A. Golubchina and G. S. Golubchin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1472-1479 Original language doc. previously announced in IAA as A84-20816 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The relay-race method, implemented on the RATAN-600 radio telescope, is considered as a possible technique for constructing two-dimensional images of the Sun and tracking the development of intense, rapidly varying sources. This technique uses a reduced aperture with a secondary reflector situated at the center or near the center of the telescope. In the relay-race mode with zoning the aperture increases due to an increase in the number of reflecting elements, distributed with shifts that are multiples of the wavelength over the optical path. As an example this method is used to construct solar maps on the basis of observations carried out on February 9 and 10, 1980 at the northern sector of RATAN-600. B.J. (IAA)

N85-15006# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF LATERAL-SCAN INTERFEROMETER Abstract Only **c35**
B. A. Dubinskiy and S. O. Kuzmin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 11 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1480-1483 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The performance of a correlational interferometer for study of radio-contrast formation of the surface of Earth and other planets is analyzed, considering that such an interferometer must be mounted on an aircraft or spacecraft with its fixed-length baseline parallel, at least approximately, to the vector of the course velocity. The geometrical relations for such an instrument, in effect a lateral-scan interferometer performing aperture synthesis, are formulated in a cylindrical system of coordinates and a point source is assumed. Calculations yield the synthesization diagram representing the indeterminacy function as well as the accuracy in terms of resolution and sensitivity, with K = the square root of (2 pi lambda L)/1 (X - wavelength, L = baseline length, 1 = antenna aperture along given coordinate) as a parameter and taking into account the signal-to-noise ratio. Author

N85-15007# Joint Publications Research Service, Arlington, Va.
SOFTWARE FOR CRIMEA-PUSHCHINO RADIOINTERFEROMETER Abstract Only **c35**
L. R. Kogan and L. S. Chesalin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 11-12 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1483-1486 Original language doc. previously announced in IAA as A84-20818 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The software for the Crimea-Pushchino VLBI makes it possible to study both compact sources emitting in the continuum and spectral-line-emitting maser sources. Six modes of data processing are utilized, making possible the estimation of the dimensions of compact components, the mapping of maser sources, the determination of the maximum time of coherent integration, the use of reference details, etc. The time of processing of a single pair of magnetic tapes (with a recording time of 6 min) on the ES 1040 is about 1 h for 5C delay steps. B.J. (IAA)

N85-15008# Joint Publications Research Service, Arlington, Va.
PRIMARY DATA PROCESSING IN VERY LONG BASELINE RADIOINTERFEROMETER Abstract Only **c33**
P. A. Fridman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 12 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1487-1493 Original language doc. previously announced in IAA as A84-20819 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

An algorithm for the primary processing of data in a VLBI is proposed which includes all the main steps in the processing of clipped noise signals: from magnetic-tape reading to the formation

of the interferometric response. A block diagram of the primary processing system is presented, and the signal-to-noise ratio at the VLBI output is discussed in relation to the primary-processing technique used. B.J. (IAA)

N85-15009# Joint Publications Research Service, Arlington, Va.
INVARIANCE OF MEAN-SQUARE EFFECTIVE AREA OF SYNTHESIZED APERTURES Abstract Only **c32**
B. A. Dubinskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 13 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1493-1496 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Aperture synthesis on the basis of field coherent functions is considered from the standpoint of correlational field processing by additive antennas. Departures of such apertures from the law of mean-effective-area conservation make it necessary to establish another law of conservation make it necessary to establish another law of conservation viable for energy parameters. This is done, considering that the mean effective area remain invariant, inasmuch as the radiation power pattern represents the radiation field-intensity pattern squared. Accordingly, an analog of the original law of conservation is constructed which takes into account quasi-periodicity as well as invariance in space. It pertains to the mean-sqaure effective area instead, which is shown to be constant over the entire field of vision and elates the maximum effective area of a synthesized aperture to the radiation power pattern of the antenna. Design and performance calculations based on this parameter as invariant yield other energy parameters also in mean-square terms. Author

N85-15010# Joint Publications Research Service, Arlington, Va.
ENERGY CORRELATION BETWEEN NATURAL EXTRA-LOW-FREQUENCY NOISES AT VARIOUS FREQUENCIES Abstract Only **c32**
A. P. Nikolayenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 13-14 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 3-11 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The correlation function is derived for the energy of natural extra-low-frequency noises at the outputs of two extra-low-frequency receivers, each tuned at the input to a different frequency of storm activity in a closed Earth-ionosphere channel. Such a receiver essentially consists of a narrow-band second-order filter, a square-law detector, an integrator, and a recording device for the vertical electric field component, both the bandwidth and integration time being finite. The input signal is a random sequence of radio pulses, with interference of radio waves from neighboring lightning discharges in global storm activity. The spectral characteristics of the output noise are determined from statistical analysis of readings, which depend on the signal processing by the receiver components. The interfrequency correlation coefficient is first calculated for the ideal case of rare single input pulse signals without background radiation, and then for the real case of frequent interfering input pulse signals with ambient noise. The frequency dispersion is found to make estimates of the energy spectrum of signals from lightning distributed in space more accurate and stable than those of the energy spectrum of signals from lightning concentrated at one point. Author

N85-15011# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL RESULTS OF STUDY OF ARTIFICIAL PERTURBATION REGION IN UPPER AND LOWER IONOSPHERE DISTURBANCE BY THE METHOD OF VERTICAL PROBING Abstract Only **c46**
Ye. A. Benediktov, N. P. Goncharov, Yu. A. Ignatyev, S. N. Matyugin, and P. B. Shavin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 14 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 12-17 Original language doc. previously announced as A84-27077 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

An experiment was conducted in May 1982 to study the parameters of an artificially disturbed area in the F-region, produced under the effect of high-power (20 MW) short-wave radio transmissions at a frequency of 5.75 MHz. It is shown that an artificially disturbed region was formed with a Delta N(e)/N(e) ratio of not less than about 0.05, and that N(e) (electron density) irregularities were generated or intensified. This disturbed region was found to act like a focusing lens on radio sounding waves passing through it. An intensification of N(e) of 0.05 was found to occur in the E-region in the course of 30 sec. B.J.(IAA)

N85-15012# Joint Publications Research Service, Arlington, Va.
FIELD COHERENCE FUNCTION IN LAYERWISE NONHOMOGENEOUS TROPOSPHERE Abstract Only **c46**
A. V. Kukushkin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 14-15 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 18-27 Original language doc. previously announced in IAA as A84-27078 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A system of equations for the field-coherence function is derived for a surface duct with turbulent fluctuations of the refractive index in the troposphere. This system makes it possible to account for energy exchange between the surface duct and the higher layers of the troposphere. The results are pertinent to the study of centimeter-wave propagation in the surface duct above the sea surface. B.J. (IAA)

N85-15013# Joint Publications Research Service, Arlington, Va.
SCATTERING OF ELECTROMAGNETIC WAVES BY SURFACE WITH SMALL ASPERITIES Abstract Only **c32**
Zh. D. Genchev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 15 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 48-55 Original language doc. previously announced in IAA as A84-27081 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Second-order perturbation theory (the Rayleigh-Rice approximation) is used to derive an analytical expression for the electromagnetic field scattered by periodic and slightly rough surfaces, characterized by an arbitrary permittivity. This expression is used to analyze: (1) critical phenomena (Wood anomalies) arising during thermal radio emission from a periodically rough water surface; and (2) a second-order radar cross section, describing the amplitude of high-frequency waves scattered by a slightly rough surface (e.g., the disturbed sea surface). B.J.(IAA)

N85-15014# Joint Publications Research Service, Arlington, Va.
APPROACH TO SOLUTION OF DIFFRACTION PROBLEM FOR WAVES AT ROUGH SURFACE Abstract Only **c32**
A. N. Teokharov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 15-16 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 65-70 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A method for considering wave diffraction by a rough surface is proposed which involves the reduction of surface scattering to bulk scattering and the subsequent application of procedures for the analysis of multiple scattering in the theory of wave propagation in randomly irregular media with a discontinuous refractive index. This approach is used to solve the Dyson equation in the Bourret approximation for the mean as well as the Bethe-Salpeter equation in the ladder approximation for the correlation function of a scalar field scattered by an infinite ideally reflecting statistically regular surface. The solutions to these equations take into account the shadowing of some sections of the surface by others. B.J.(IAA)

N85-15015# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF ZEROS IN RADIATION PATTERN OF LINEAR ANTENNA ARRAY Abstract Only c32
Ya. V. Vasilkiv, A. M. Kovalchuk, and P. A. Savenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 16 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 96-103 Original language doc. previously announced in IAA as A84-27085 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Three methods for the formation of zeros in the radiation pattern of a linear equidistant array are examined in the framework of the theory of adaptive phased arrays. Two approaches assure minimum expenditures of computer time, while the third approach can be used for the phase and amplitude-phase synthesis of a scanning array with the simultaneous formation of a zero in a given direction. B.J.(IAA)

N85-15016# Joint Publications Research Service, Arlington, Va.
RELATION BETWEEN POLARIZATION OF ARTIFICIAL LOW FREQUENCY RADIATION AND PARAMETERS OF AURORAL IONOSPHERE Abstract Only c46
V. F. Larin, V. S. Smirnov, A. N. Vasilyev, A. A. Ostapenko, and L. Ye. Solovyeva *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 17 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 104-105 Original language doc. previously announced in IAA as A84-27086 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

An experiment was performed for the purpose of determining the effect of modulated high-power high-frequency radio emission on the ionosphere, specifically excitation of low-frequency radiation at modulation or combination frequencies. On the basis of the established relation between intensity of the combination-frequency signal and parameters of the auroral ionosphere, a relation is now established between polarization of the combination-frequency fields and parameters of the auroral ionosphere. Measurements for this were made with a 100 kW transmitter feeding a zenithal antenna (gain G = 100) and with a receiver 56 km (lambda = 64 deg) away. The results reveal that the orientation of the major axis of the polarization ellipse depends on the orientation of the auroral electric field and on the electron concentration in the lower ionosphere. The results agree qualitatively with theoretical results based on modulation and natural ionospheric currents. Author

N85-15017# Joint Publications Research Service, Arlington, Va.
ANTENNA MATCHING DEVICE TUNING FOR TYPE ZhRU RADIOSTATIONS Abstract Only c33
M. I. Iof *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 17 Transl. into ENGLISH from Avtomatika, Telemekhan. (Moscow), no. 2, Feb. 1984 p 39-40 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The antennas employed with the ZhR series radiostations are lengths of wire 11 to 14 meters long suspended 0.4 to 0.6 meters above the locomotive cab, with their end grounded through the locomotive cab. The antenna matching device must be tuned properly, because it is this device which finally determines the effective transmitter power and the condition of the antenna feed devices. Adjustment of the antenna matching device by means of front-panel controls is described, and the meanings of various ammeter readings are interpreted. Author

N85-15018# Joint Publications Research Service, Arlington, Va.
SELECTION OF PARAMETERS FOR IMAGE DECOMPOSITION BY TELEVISION SYSTEM FOR RECOGNITION OF GROUP OF POINT SOURCES c32
D. P. Rakcheyev and A. S. Tolstikov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 18-22 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Proborostr. (Leningrad), v. 27, no. 4, Feb. 1984 p 3-7 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Signal detector probability for recognition of a group of point sources is estimated taking into account television raster discreteness. A method for selecting image decomposition parameters is proposed which compensates for the effects of image movement and dynamic variation of the signal. M.G.

N85-15019# Joint Publications Research Service, Arlington, Va.
TRANSIENT CURRENTS OF IDEALLY CONDUCTING BODY OF REVOLUTION WITH TRANSIENT DIFFRACTION Abstract Only c32
Ye. N. Vasilyev and I. G. Yefimova *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 23 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 87-95 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Scattering of smooth video pulses such as Gaussian ones by an ideally conducting body of revolution is analyzed on the basis of integrofunctional equations of transient diffraction. These equations for the azimuthal harmonics of the induced surface current density, are formulated in terms of a Fourier series. The scatterer surface is subdivided into area elements and the transient period is discretized, utilization of the axial symmetry making it possible to reduce the computer time and memory volume necessary for numerical solution of the problem by approximately one order of magnitude. Calculations by this method yielded current transients on a sphere and on a cone as well as the amplitude-frequency and phase-frequency characteristics of current density on a sphere at the theta = +90 deg point. Typical results agree within 5.3% with those obtained by the method of eigenfunctions or by the method of time-integral equations. Author

N85-15020# Joint Publications Research Service, Arlington, Va.
INTERNAL STRUCTURE OF MICROPROCESSOR Abstract Only c60
V. Ye. Lokhmatyy and S. I. Trankov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 30 Transl. into ENGLISH from Avtomatika, Telemekhan. (Moscow), no. 1, Jan. 1984 p 32-34 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Microprocessor technology is described based upon the series-produced 8-bit KR58OIK8OA microprocessor which is intended for control of microcomputers and multiprocessor systems. The unit consists of the following circuits: arithmetic logical unit, control unit, registers, data and address buffers, timing unit and inner bus. The arithmetic logic unit carries out operations on data and the results are stored in the accumulator. It also has a flag register for operation control (including parity checking) and command generation. The utility of the processor depends largely upon the capacity and organization of the six 8-bit general use registers for intermediate storage. A selector circle finds the required locations. The register block includes a 16-bit stack pointer with last in first out characteristics for temporary storage with a stack volume of 64-kbyte. Unloading is handled by 8-bit data buffers and 16-bit address buffers. The control unit determines processing and locating and storing data and coordinates all blocks while the timer fixes the machine cycle and unit output/input. R.J.F.

N85-15021# Joint Publications Research Service, Arlington, Va.
CHOICE OF CRITERIA FOR REJECTION OF INSULATING COMPONENTS IN HIGH-VOLTAGE SURGE EQUIPMENT Abstract Only c33
V. Ya. Ushakov, V. F. Vazhov, and A. Ya. Umnov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 31 Transl. into ENGLISH from Elektrichestvo (Moscow), no. 2, Feb. 1984 p 66-70 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A systematic approach to rejection of insulating components in high-voltage surge equipment is developed on the basis of

changes in surge strength. Data on the effect of pretesting or aging on the ability to withstand single surges and repetitive surges, respectively, were gathered in experiments with polyethylene insulation. Lots of 40 specimens were subjected to single ramp pulses of positive polarity, breakdown occurring on the average after (0.6 to 1) times 10 to the minus 6th power seconds at an electric field intensity of 226 kV/mm. Lots of 200 specimens were subjected to repetitive pulses with the electric field intensity stepwise decreased from 181 to 75 kV/mm. The data was evaluated in terms of fitting empirical distributions of rejects, a composite Weybull distribution later reduced to a simple linear one, and curves of surge strength as a function of aging. The results indicate that the critical points where those curves bend, criteria for rejection, should be determined on the basis of 3-5 different surge amplitudes within the (1.1-1.5) v nominal range of voltages. It is then necessary and sufficient to terminate preliminary tests at those critical points and to measure the single-surge strength margin. One can now calculate and use the optimum electric field intensity and Weybull distribution exponent for rejection tests. R.J.F.

N85-15022# Joint Publications Research Service, Arlington, Va.
AHARONOV-BOHM EFFECT IN ABSORPTION OF ELECTROMAGNETIC WAVE Abstract Only **c32**
R. Bakanas *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 32 Transl. into ENGLISH from Litovskiy Fiz. Sb. (Vilnius, USSR), v. 23, no. 6, Jun. 1983 p 52-56 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The possibility of the wave function and of the energy spectrum of an electron moving outside a magnetic field depending on the magnetic vector potential, called the Aharanov-Bohm effect, is examined relative to absorption of an electromagnetic wave in a solid body. A circularly polarized electromagnetic wave is assumed to propagate without space dispersion in the axial direction along a thin hollow cylinder surrounding a point source of a magnetic field such as a narrow solenoid with negligible flux leakage. The absorption coefficient is calculated in the lowest-order approximation of wave-electron interaction. In a nondegenerate electron gas with an infinite sequence of o-form absorption peaks, their magnitudes and frequencies are found to depend on the magnetic flux, as are the intensities and locations of absorption lines in a degenerate electron gas subject to the Pauli principle. This is demonstrated by numerical estimates on the basis of typical data. The absorption anomaly occurs also in thick bodies. R.J.F.

N85-15023# Joint Publications Research Service, Arlington, Va.
ACOUSTOELECTRIC INTERACTION IN DOUBLE-LAYER SEMICONDUCTORS Abstract Only **c76**
V. Kunigelis *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 32-33 Transl. into ENGLISH from Litovskiy Fiz. Sb. (Vilnius, USSR), v. 23, no. 6, Jun. 1983 p 57-62 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Absorption of surface acoustic waves as well as the transverse acoustoelectric effect and convolution of oppositely traveling surface acoustic waves in a double-layer semiconductor are calculated by a simple and fairly accurate method. After the two-dimensional problem is reduced to a one-dimensional one, the corresponding Poisson equation and the equation of continuity for a nonlinear current yield a fourth-degree differential equation which describes the electric potential in the semiconductor as a function of the vertical coordinate (distance from the piezoelectric substrate). Simplifying approximation are made applicable to a thin semiconductor film technologically deposited on a thicker one with a higher electrical conductivity. The results reveal that absorption can be decreased by decreasing the thickness of the surface film and increasing the electrical conductivity of the lower semiconductor layer in direct contact with the piezoelectric substrate, inasmuch as the absorption peak is found to shift toward lower electrical conductivity of that layer. R.J.F.

N85-15024# Joint Publications Research Service, Arlington, Va.
LOW FREQUENCY NOISE IN OSCILLATOR WITH LIMITED SPACE-CHARGE ACCUMULATION Abstract Only **c33**
V. V. Zaytsev, V. B. Orlov, and A. V. Yakimov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 33 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 79-86 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Operation of a Gunn-diode microwave oscillator in the limited space-charge accumulation mode is analyzed for possible causes of low-frequency noise, such a noise also occurring but through different mechanisms in domain modes of operation. Calculations for a GaAs device with uniform doping over the active region and with uniform field distribution point to accumulation and propagation of space-charge perturbations by local inhomogeneities as the likely source of low-frequency fluctuations of the space-charge oscillation amplitude and frequency. A subsequent analysis of the fluctuation characteristics of such an oscillator, with flicker fluctuation of the initial concentrations of free charge carriers as the main source of noise which also modulates the induced current, reveals that limited accumulation and dissipation of space charge can cause frequency fluctuation of the output signal without pulling the oscillator out of synchronism. R.J.F.

N85-15025# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF ENERGY CONVERSION DURING LOCKING OF ELECTRON BUNCHES BY ELECTROMAGNETIC WAVE IN LONGITUDINAL ELECTROSTATIC FIELD Abstract Only **c33**
Ye. D. Belyavskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 34 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 123-126 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The variational method is used for theoretically optimizing the energy conversion during locking of long electron bunches by the longitudinal field component of a traveling electromagnetic wave with large amplitude E in a longitudinal electrostatic field of intensity E sub st. The governing three nonlinear equations and one inequality for such a distributed system are formulated so as to allow for a widely arbitrary variation of the electrostatic field, with stable motion of the oscillators (electrons) as the only constraint. The optimum law of this variation, which will yield the most efficient conversion of electrostatic field energy to traveling wave energy, is then sought on the basis of Pontryagin's maximum principle and a solution of the Euler equation for an appropriately introduced auxiliary functional. Calculations reveal that the space width of an electron bunch decreases and the amplitude of a traveling wave increases in the forward axial direction. Increasing the amplitude of the traveling wave will result in decreasing the phase width of the electron bunch and shifting of its center toward the peak of the wave's retarding field. As the phase width of the electron bunch is decreased, the ratio E/e sub st increases toward its limit of unity. The results of this analysis are applicable to the design of traveling-wave tubes. R.J.F.

N85-15026# Joint Publications Research Service, Arlington, Va.
DEVICE FOR MEASURING AVERAGE POWER OF LASER RADIATION Abstract Only **c36**
G. M. Gandelman, B. N. Levinskiy, and R. R. Shurgaya *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 36 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 17-18 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A device was developed for measuring the power of continuous high-intensity radiation of wide laser beams. The receiver part consists of three metal plates spot-welded to one another, the center plate on top bridging the outer two. The plates can be made of the same or different materials and have the same or different dimensions. The simplest configuration with a tantalum plate between two nickel plates and a laser beam of given cross

section impinging only on one of the three is considered as a specific variant. Heat transfer and energy balance relations in this system are analyzed, taking into account diffusion, conduction, and reflection as well as singular conditions at the two joints. A voltmeter across the outer two plates reads the potential difference, which includes the thermal emf and is proportional to the incident radiation power over a wide dynamic range. Most coefficients in the voltage-temperature-power relation can and must be evaluated empirically, whereupon this device becomes suitable for power measurement with an accuracy determined by the laser beam instability and the instrument scale error. R.J.F.

N85-15027# Joint Publications Research Service, Arlington, Va.
FORMATION OF REFERENCE SIGNALS IN LASER-TYPE GAS ANALYZERS WITH MECHANICAL SWITCHING OF OPTICAL CHANNELS Abstract Only c36
N. Yu. Melikov and V. A. Balakin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 36-37 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 18-19 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A gas analyzer of the laser-absorption type consists of mechanically switched optical channels and a signal detecting electronic converter. A method of forming reference signals is proposed which will ensure exact synchronization of both components for maximum sensitivity and interference immunity during channel switching and signal detection. This method is applicable specifically to such a gas analyzer with two-beam, two-wave measurement of low light absorption levels. The intensity of radiation impinging on the data gathering photoreceiver is converted to an electric signal of a certain amplitude in the case of an analog converter or to a pulse repetition rate in the case of a digital one. In each case the reference signal is formed by a rotating disk with slots spaced in a certain sequence. The main function of the converter is to determine the ratio of the intensity drop to the intensity in the optical etalon channel. In the analog mode the photoreceiver output voltage is alternately sampled and stored, its magnitude being proportional to the duration of the reference pulses and thus to the disk speed. In the digital mode the reference signals define the instants of time at which individual converter elements are switched on, this being more practical than ensuring equal time intervals of pulse counting. R.J.F.

N85-15028# Joint Publications Research Service, Arlington, Va.
MEASURING LARGE AMPLITUDES OF MECHANICAL VIBRATIONS WITH LASER INTERFEROMETERS Abstract Only c36
A. N. Bondarenko and V. P. Trotsenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 38 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 26-27 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Heterodyne methods of laser interferometry are the most promising methods of measuring large mechanical vibrations, their main advantages being that they are contactless and remote operational, and their main features being high accuracy and reproducibility of readings. However, use of a square-law photodetector and a frequency detector with a laser interferometer requires conversion to single-frequency laser radiation to two-frequency one. An attendant problem is to provide a stable and efficient wideband heterodyne with wide dynamic range for a reference signal with a Doppler frequency shift sufficiently large relative to the frequency of the probing signal. One known method of such interferometry which meets these requirements involves use of an oscillograph and an electronic-counter frequency meter. The principle of this method is outlined on the example of one mirror of a two-beam interferometer, assuming that its vibrations are harmonic. The interferometer for this application consists of a light splitter, a reference mirror, and a movable mirror with a Teflon membrane controlled by a sine-wave generator. The light source is an LG-79/1 He-Ne laser. The photodetector is an FD-21 KP photodiode with a time constant of 6 ns. Vibrations are measured with a Ch3-34A frequency meter. R.J.F.

N85-15029# Joint Publications Research Service, Arlington, Va.
OPTICAL METHOD OF MEASURING VELOCITY OF SHEAR WAVES Abstract Only c35
V. I. Arkhipov, A. N. Bondarenko, and A. I. Kondratyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 38-39 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 27-28 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Optical excitation and recording of ultrasonic vibrations for measuring the velocity of shear waves includes a ruby pulse laser as the light source. A light splitter plate deflects one part of the laser radiation through a focusing lens to an FD9E111 photodiode which triggers a recording oscillograph. The other part of the laser radiation, transmitted through the glass plate, is focused through a lens onto the specimen, typically a disk. Radiation pulses reflected by the lateral surface of the specimen proceed to a coaxially oriented laser interferometer with a 250 MHz reproducibility bandwidth. The interferometer output signal, proportional to the displacement in the ultrasonic pulse in the disk, passes through a low-pass filter and then a wideband amplifier to an S8-12 oscillograph with memory and a G5-48 pulse generator-shaper. Output signals from the latter proceed to a CH3-34A frequency meter operating in the mode of time interval measurement. R.J.F.

N85-15030# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF ELECTROMAGNETIC FIELD COMPONENTS FROM ARBITRARILY ORIENTED GYRO PLATFORMS Abstract Only c32
M. B. Sultanov and V. A. Shcherbakov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 39 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 40-41 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Measuring the variations H and E of weak electromagnetic field components with a set of gyros on arbitrarily oriented platforms, with simultaneous measurement of orthogonal components of two known noncollinear physical vector quantities, is an effective method of determining natural electromagnetic fields with relatively simple apparatus and without electromagnetic interference from the platform orientating equipment. An analysis of the governing relations in two systems of coordinates, one system tied to the platform and one basal system (X-axis in direction of terrestrial magnetic field H, Z-axis in direction of terrestrial gravitational field G) reveals that from measurements of the components of vectors H and G in both systems of coordinates, it is possible to either determine the platform orientation in space or the components of variations H and E in the basal system of coordinates. An accuracy analysis of such measurements indicates that the angle error of platform orientation depends on the angle between vectors G and H. The error of H measurement, taking into account the mean level of its natural variation, is of the order of 0.5%. R.J.F.

N85-15031# Joint Publications Research Service, Arlington, Va.
INFRALOW-FREQUENCY DIGITAL PHASE METER Abstract Only c35
A. A. Anepir, Ye. A. Anepir, O. I. Gutorov, V. N. Zainchkovskiy, and Yu. G. Mikhaylov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 40 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 41-43 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Digital methods of measuring phase shifts in the infralow-frequency range are most effective, in terms of high speed and insensitivity to frequency changes in the input signal, but the output signal depends on the frequency of the input signal voltage. This drawback can be overcome by various means such as synchronization or special correction. Precise multiplication of the input signal frequency by a given factor and subsequent filling with the high-frequency of the entire time interval generated by a start-stop module will yield the optimum performance characteristics without additional calibration or correction. Such an instrument

consists of two amplifier-limiter stages producing rectangular pulses with a 0.5 duty factor, a mode selector shaping pulses with either of the corresponding two durations, a high-frequency frequency signal generator, a trigger, a frequency divider, a digital period meter, a transcriber, a reversible counter, an OR circuit, two AND circuits, a counter, and three driven multivibrators. In order to cover a wide frequency range, it is necessary to use multidigit devices or, simpler, to generate a set of frequencies not higher than a certain multiple of the pulse repetition rate at the mode selectro output. R.J.F.

N85-15032# Joint Publications Research Service, Arlington, Va.
APPARATUS FOR MEASURING DIELECTRIC CHARACTERISTICS OF POLYMER MATERIALS IN MILLIMETRIC RANGE OF WAVELENGTHS AT 4.2-300 K TEMPERATURES Abstract Only **c35**
A. P. Geppe, V. S. Dobromyslov, V. V. Kostromin, and D. Ya. Galperovich *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 41-42 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 57-58 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

An apparatus was built for measuring the dielectric permittivity and loss tangent of polymer insulation materials, specifically polyethylene and fluorocarbons such as polytetrafluoroethylene, over a wide frequency range (25-50 GHz in 0.4-0.6 GHz steps) at temperatures from 4.2 to 300 K. The cryostat contains liquid helium in the inner vessel and liquid nitrogen in the outer vessel, two metal waveguides fastened to the cover, a rectangular dielectric waveguide (PDV-6 or PDV-8 to cover the entire frequency range) between the metal ones and connected to each through an exciter made of metal, a disk resonator made of the tested material, and a draw bar with micrometer screw for adjustment of distances between waveguides. The metal waveguides are connected to the measuring system which includes a microwave oscillator, a saw-tooth-voltage generator, an auxiliary oscillator, a detector, an attenuator, a cavity wavemeter, and an oscillograph. The temperature distribution in the cryostat is stabilized by means of reflecting 100-mm thick copper-clad polystyrene shields and 0.5 mm thick copper shields inside. R.J.F.

N85-15033# Joint Publications Research Service, Arlington, Va.
DEVICE FOR FREQUENCY STABILIZATION OF MICROWAVE OSCILLATORS Abstract Only **c35**
V. I. Yevgrafov and A. F. Simonyuk *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 42 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 61-62 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

A device for precision frequency setting and frequency stabilization of microwave oscillators is described, which, essentially, provides phase-look frequency control by means of a frequency meter, a frequency converter, and a synchronizer. The frequency meter consists of a high-stability 5 MHz oscillator and 10:1 or 20:1 frequency multiplier. The multiplier output signal is converted by a harmonic generator with a tunable output filter. The filtered signal from the harmonic generator and the output signal from the microwave oscillator to be stabilized combine in a mixer which puts out an intermediate-frequency signal. The latter is amplified and then fed back to the microwave oscillator through a synchronizer consisting of a phase detector and a d.c. amplifier. Two stabilitrons and a 3 kohm resistor protect the d.c. amplifier against high-voltage pulses during switching of the 50 MHz oscillator and the harmonic generator from one mode of operation to another. Author

N85-15034# Joint Publications Research Service, Arlington, Va.
EFFECT OF EXTERNAL MAGNETIC FIELD ON CHARACTERISTICS OF CURRENT-CARRYING STEEL TAPE Abstract Only **c32**
V. N. Ostreyko and Yu. L. Chernikov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 43 Transl. into ENGLISH from Elektrichestvo (Moscow), no. 2, Feb. 1984 p 42-47 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The behavior of a current-carrying tape of steel or other ferromagnetic material in an external magnetic field is analyzed, specifically for the case where the magnetic-induction vector is tangent to the tape surface and normal to the current-density vector. Interaction of the external magnetic field and the intrinsic magnetic field within the tape volume, the former a uniform one and the latter a nonuniform one, is treated as a superposition of such fields in a nonlinear medium. A mathematical model is constructed for constant magnetic fields and a rectangular strip of width 2h and thickness 2d. Calculations are based on the fundamental law of magnetic circuits. Author

N85-15035# Joint Publications Research Service, Arlington, Va.
MAGNETIC FIELD CALCULATION FOR IDEAL CONDUCTORS BY METHOD OF EQUIVALENT CURRENTS Abstract Only **c33**
V. M. Mikhaylov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 44 Transl. into ENGLISH from Elektrichestvo (Moscow), no. 2, Feb. 1984 p 49-52 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The magnetic field of an array of N coaxial conductors carrying direct current, a plane-meridional magnetic field, is calculated by the method of equivalent currents. In accordance with the fundamental equation of field force lines enveloping all conductors, the problem is formulated as one of determining the magnitude and the distribution of currents which will satisfy that equation on the contour of an axial conductor section. The procedure involves superposing the magnetic fields of all individual conductors. The magnetic vector potential in that equation then appears as the sum of N terms containing complete elliptic integrals of first and second kinds. The equation is reduced to a system of algebraic equations by the least squares method. The algorithm is applied to and numerical results are shown for a heavy single-term solenoid with rectangular conductor cross section and two parallel busbars with rectangular conductor cross section carrying forward as well as return currents, and two diverse model examples, inductance calculations being included in the second case. Author

N85-15036# Joint Publications Research Service, Arlington, Va.
SCATTERING OF H10-MODE WAVE BY NARROW CONDUCTING PLATE INSIDE RECTANGULAR WAVEGUIDE Abstract Only **c32**
I. M. Yakover *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 45 Transl. into ENGLISH from Litovskiy Fiz. Sb. (Vilnius, USSR), v. 23, no. 6, Jun. 1983 p 63-69 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Asymptotic relations are derived for scattering of an H(10)-mode wave by a thin (relative to skin depth) and narrow rectangular plate in a cross section of an infinitely long rectangular single-mode waveguide, this plate being oriented with its narrow sides parallel to the narrower waveguide walls. Such a plate does not appreciably perturb the incident field. The corresponding integral equation is solved for the jump of tangential magnetic field components at such an inhomogeneity, whereupon the shunting impedance in the two-port equivalent network is calculated. For an impedance film, the scalar potential cannot be defined and the problem is solved by the Galerkin method. For a small barrier far from the waveguide walls, with both length and width much smaller than the wavelength, the problem is solved in the dipole approximation, assuming that an incident field slowly varies over the barrier volume. The dependence of the shunting reactance on the wavelength and of the modulus of the shunting impedance on the surface impedance of the plate agrees numerically within 10% with results based on the exact solution. Author

N85-15037# Joint Publications Research Service, Arlington, Va.
BUILDUP OF OSCILLATIONS IN TWO-MODE GYROTRON Abstract Only **c35**
V. Ye. Zapevalov and G. S. Nusinovich *In its* USSR Rept.: Electron.

and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 46 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 117-120 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Power gyrotrons with evolution of the interaction space are considered for generating stable single-mode oscillations under conditions favoring self-excitation of several modes. Interaction of two modes, occurring in small resonator cavities, can be treated as a suppression of the mode with a smaller initial increment than that with a larger initial increment and as a nonlinear excitation of the second mode after excitation of the first mode acting as a primer. The attendant transient processes in a two-mode gyrotron are described by a self-consistent system of equations including a short equation of motion for electrons in an external magnetic field and in the field of two modes as well as equation of mode excitation, the same equation for both modes. These equations are supplier anted with an integral expression for mode excitation by an electron beam. Numerical analysis of this system for two modes having Gaussian longitudinal profiles and resonating at the fundamental gyrofrequency or at its multiple confirm that both mechanisms stabilize single-mode oscillation under efficiency-optimum conditions and also that stable two-mode oscillation is possible. Author

N85-15038# Joint Publications Research Service, Arlington, Va.
HOLOGRAM BLEACHING Abstract Only c35
N. L. Kosobokova and G. P. Fayerman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 51 Transl. into ENGLISH from Zh. Nauch. i Prikl. Fotografii i Kinematografii (Moscow), v. 29, no. 1, Jan.-Feb. 1984 p 52-56 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The physical and chemical foundations underlying the processes involved in bleaching developed images are examined. The results of an investigation of hologram bleaching processes in order to increase their diffrction efficiency, to insure spectral nonselectivity and to prevent bleached holograms from darkening when exposed to light are described. Bleaching of amplitude holograms processed in D-19 developer transforms them to phase holograms and increases their diffraction efficiency; it does not increase the diffraction efficiency of phase holograms developed with holographic developers. The bleached image is spectrally non-selective. Author

N85-15039# Joint Publications Research Service, Arlington, Va.
RECORDING HOLOGRAMS ON THIN FILMS OF TITANIUM DIOXIDE Abstract Only c35
Yu. V. Nechepurenko, A. M. Polikanin, V. G. Sokolov, G. A. Branitskiy, and B. A. Budkevich *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 51 Transl. into ENGLISH from Zh. Nauch. i Prikl. Fotografii i Kinematografii (Moscow), v. 29, no. 1, Jan.-Feb. 1984 p 70-72 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

The influence of the photographic processing conditions on the attainable diffraction efficiency in recording holograms on TiO2 layers using an N-type laser (lambda = 337.1 nm) is described. The diffraction efficiency of amplitude phase holograms as a function of the exposure is extremal. The position of the maximum depends little upon the type of metal (silver or nickel) from which the diffraction gradient is made. Photographic materials based on thin transparent films of TiO2 can be used for recording transmitted and reflected holograms. Author

N85-15040# Joint Publications Research Service, Arlington, Va.
ELECTROOPTICAL SENSOR FOR AUTOMATIC DETECTION OF OBJECTS c74
A. L. Andreyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 52-58 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), v. 27, no. 4, Feb. 1984 p 79-85 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

An electrooptical sensor employing a charge coupled device is examined. This sensor contains a tuneable spacetime logic filter in microprocessor form. Analytical expressions are given for computing the optimum parameters of the filter with given observation conditions. The speed-of-response is evaluated. This sensor may be employed in constructing an automatic television detection system which is adaptable to changing conditions. Author

N85-15041# Joint Publications Research Service, Arlington, Va.
PERCEPTIBILITY OF NONLINEAR DISTORTIONS IN POWER AMPLIFIER Abstract Only c33
Valentin Leksin and Viktor Leksin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 59 Transl. into ENGLISH from Radio (Moscow), no. 2, Feb. 1984 p 33-35 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

Nonlinear distortions in an audio power amplifier with transistors are analyzed from the standpoint of performance in a variety of sound recording equipment. Minimization of the rippler factor has been always a major design goal, but an unjustifiably rigorous one vis-a' -vis distortions in other components of the system. Those include noise in the signal, distortion caused by wear of the tape or disk during recording and playback, and nonlinear distortions in the loudspeaker which principally depend on the dynamic range of the head. The effective overall rms ripple factor is defined, including the equivalent of all these other distortions. The actual harmonic content is evaluated on the basis of available data on the performance of some of the most popular sound recording equipment, both domestic and foreign. Guidelines are suggested for experimentally determining the amplifier ripple factor through measurement and then weighing its contribution to the overall distortion level in terms of perceptibility. Author

N85-15042# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING
25 Sep. 1984 131 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UEE-84-011) Avail: NTIS HC A07/MF A01

Various topics in electronics and electrical engineering and applications are addressed. Subject areas include acoutics and signal processing, antennas and propagation, communications and consumer electronics, circuits and systems, computers, electron devices, instrumentation and measurements, microwave techniques, and power engineering. For individual titles, see N85-15043 through N85-15085.

N85-15043# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF MOVING-TARGET SELECTION RADAR DEVICES FOR NONGAUSSIAN SIGNALS FOR STATIONARY TARGETS Abstract Only c32
V. G. Valeyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 2 Transl. into ENGLISH from Radiotekh. Electrotek. (Moscow), v. 29, no. 4, Apr. 1984 p 691-697 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The capabilities of coherent and incoherent moving target selection devices employing special nonlinear programming in order to enhance suppression of signals from interfering targets are examined. Moving target selection frequency effectiveness is improved by using additional amplitude suppression of passive interference. The characteristics of the optimal nonlinear element which provides amplitude suppression are determined. Author

N85-15044# Joint Publications Research Service, Arlington, Va.
RESOLUTION AND ACCURACY OF RADAR MEASUREMENTS Abstract Only c32
V. I. Serebrennikov and G. Ya. Shtekman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 2 Transl. into ENGLISH from Radiotekh. Elektrotek. (Moscow), v. 29, no. 4, Apr. 1984 p 705-715 Original language document

announced as A84-32136 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The present study introduces the concept of the spatial temporal ambiguity function (STAF) which characterizes the antenna selectivity during the measurement of range and angular coordinates. An analysis is made of the effect of STAF on the resolving power and potential accuracy of the measurement of range and angular coordinates in phased array radar systems. It is shown that the deterioration of the resolving power and potential accuracy of range measurements can be considerable and should be taken into account even for relatively small signal bandwidths in the case of wide sector scanning. B.J. (IAA)

N85-15045# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF SYSTEMS FOR COHERENT WEIGHTED SIGNAL PROCESSING AGAINST BACKGROUND OF CORRELATED INTERFERENCE Abstract Only **c32**
D. I. Popov and V. I. Koshelev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 3 Transl. into ENGLISH from Radiotekh. Electron. (Moscow), v. 29, no. 4, Apr. 1984 p 789-792 Original language document announced as A84-32144 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A high efficiency multichannel processing system has been obtained by the use of constraints on the form of the complex processing vector, making possible a two fold reduction in the dimensionality of the synthesis problem, solved in the class of real functions. An iterative procedure for the synthesis of this system in combination with a single channel rejection filter is proposed. By optimizing the weight vectors of the filters and achieving the optimal distribution of their orders, this approach leads to a considerable improvement in the efficiency of the processing system (as compared with the system of Abramovich et al., 1976) and a close approximation to the efficiency of an optimal system. B.J. (IAA)

N85-15046# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF EXTERNAL ANTENNA CHARACTERISTICS WITH ALLOWANCE FOR DISTORTING FACTORS (REVIEW) Abstract Only **c32**
D. I. Voskresenskiy, Ye. N. Voronin, V. M. Komarov, and Ye. Ye. Nechayev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 4-19 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Modern methods for improving measurement accuracy by making allowance for the influence of the environmental situation under the actual conditions in which antennas are operated and their parameters measured are reviewed. The approach reviewed makes it possible to improve the accuracy of antenna measurements without using technically complicated and expensive means. Four scale and indirect methods of antenna measurements which consider reflections from the ground are reviewed. Near zone antenna measurements made on especially shaped shielded test ranges are analyzed. Time domain antenna measurements are described, and the use of space wobbling to eliminate interfering factors is examined. Computational methods for recovering directivity patterns with allowance for interfering reflections are analyzed. Author

N85-15047# Joint Publications Research Service, Arlington, Va.
REMOTE SOUNDING OF FIELDS IN FEED RADIATORS OF MULTI-ELEMENT ANTENNA SYSTEM WITH ALLOWANCE FOR INTERACTION WITH SOUNDING DEVICE Abstract Only **c32**
I. V. Guzeyev and V. V. Demidov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 4-5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), V. 27, no. 2, Feb. 1984 p 20-26 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

An antenna system incorporating an arbitrary type of distribution system and a multielement antenna array is sounded in order to recover the complex amplitudes of the incident waves on the inputs of the array feeds from the responses (readings) of the amplitude and phase meter of the sounding device measured in the near field of the array. The distribution of the complex amplitudes is recovered by means of a linear operator which takes into account the electrodynamic interaction of the probe and the antenna system. Amplitude phase distribution recovery error caused by failure to account for interaction between the sounding system and the antenna system is modeled by computer. Analogous methods can be employed in order to investigate interaction effects in an antenna array probe device system and to recover the amplitude phase distribution of the currents and voltages at the inputs of the radiators. Author

N85-15048# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF FLAT FINITE ANTENNA CONSISTING OF WAVEGUIDE RADIATORS Abstract Only **c32**
A. D. Khzmalyan *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 45-49 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

An element by element spectral approach is used to construct an effective mathematical model of a finite multielement antenna consisting of rectangular waveguides. The antenna studied is formed by the apertures of rectangular waveguides arranged on a metal shield on the xy plane at the nodes of a two dimensional equidistant grid. An antenna consisting of 10 x 10 (95) radiators is analyzed as an example. The method can be used to analyze antennas with a significant number of elements within a rigorous electrodynamic framework. Author

N85-15049# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF CIRCULAR-POLARIZED PRINTED RADIATORS IN PLANAR PHASED ANTENNA ARRAY Abstract Only **c32**
V. S. Filippov and B. V. Shatokhin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 5-6 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 53-57 Original language document announced as A84-25157 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Numerical results are presented on the impedance and polarization characteristics of a one channel printed radiator with circular polarization in a planar phased array. The mathematical model of the radiator is realized in the form of a FORTRAN-IV applications program package. The dependence of the impedance and polarization characteristics on the geometric dimensions of the radiator is shown, and the possibility of optimizing the characteristics in a given frequency range and scan angle section is assessed. B.J. (IAA)

N85-15050# Joint Publications Research Service, Arlington, Va.
GREEN FUNCTION IN THEORY OF MICROSTRIP ANTENNAS Abstract Only **c32**
B. A. Panchenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 65-68 Original language document announced as A84-25188 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Results are presented which illustrate the possibilities and universality of the Green-function method as applied to microstrip antennas. Angular distributions of power flux density are obtained for the first numbers of LM1 and LE1 surface waves, excited, respectively, by electric and magnetic vibrations. In addition, the radiation efficiencies of electric and magnetic type antennas are compared, and results of microstrip antenna interaction are examined for two collinear vibrators, situated above a conducting screen in free space and on a dielectric substrate. B.J. (IAA)

N85-15051# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CHARACTERISTICS OF PHASED ANTENNA ARRAY CONSIDERING INTERACTION BETWEEN RADIATORS AND PROPERTIES OF POWER DIVIDER Abstract Only **c32**
B. S. Filippov and S. A. Pavlov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 6-7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev) v. 27, no. 2, Feb. 1984 p 71-74 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A method is proposed for investigating the characteristics of infinite block phased arrays in which the elements form a regular structure, with allowance made for a power divider, which provides arbitrary amplitude phase distribution within the block. The influence of nondissipative dividers as well as dividers incorporating absorbing elements, is investigated. An effective algorithm is constructed for analyzing the characteristics of block phased arrays designed for scanning within a limited angular sector, and of ordinary phased arrays with element by element phasing, with allowance for interaction of the radiators with respect to external space as well as through the power circuits. The numerical results indicate that the influence of the power divider must be taken into account when designing phase antenna arrays. Author

N85-15052# Joint Publications Research Service, Arlington, Va.
FAST METHOD FOR CALCULATING RADIATION PATTERNS OF NONEQUIDISTANT RADIATOR SYSTEMS Abstract Only **c32**
A. N. Danilenko and M. O. Kishchenkov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 79-80 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A Fast Fourier Transformation (FFT) method is proposed which can be used directly to compute the radiation patterns of nonequidistant systems of radiators, providing a substantial savings in time over the traditional method. A computational experiment used to estimate the speed with which radiation patterns are computed by the proposed method is described. The method allows the FFT approach to be used when the initial function is assigned by a nonequidistant system of samples, e.g., in calculating the spectra of a nonequidistant pulse sequence or interpolating a function assigned by a nonequidistant system of samples. Author

N85-15053# Joint Publications Research Service, Arlington, Va.
SCATTERING MATRIX OF ANTENNA ARRAY WITH JOULE LOSSES IN RADIATORS Abstract Only **c32**
P. L. Tokarskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 81-83 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Expressions are derived for the elements of the scattering matrix of an antenna array with an allowance made for radiator losses. The formulas derived make it possible to use the scattering matrix to analyze and to synthesize antenna arrays with the dissipative radiators. The amplitudes of incident and reflected waves in the lines driving the input terminals of a system of identically polarized radiators are analyzed as an example of the use of the matrix. Author

N85-15054# Joint Publications Research Service, Arlington, Va.
SYSTEM OF EQUATIONS FOR FINDING ANTENNA RADIATION PATTERN FROM NEAR-FIELD SAMPLES Abstract Only **c32**
S. L. Solovtsov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 83-84 Original language document announced as A84-25164 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A formula is derived which provides for the expansion of the electrical field with respect to the system of plane waves passing through a slit with width a in an opaque screen in a plane $z = 0$, which is valid for any antenna whose size does not exceed a. The method is checked numerically for selected parameters. It is found that the error of the proposed method is smaller by an order of magnitude than the traditional method, and that it provides a wider reproduction sector. The weight coefficients differ significantly from the coefficients of the discreet Fourier transform, which have the same amplitude and linear phase creep. The norms of the coefficients in both cases are approximately the same. Author

N85-15055# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF TWO-FREQUENCY COMBINED DIPOLE ANTENNA ARRAYS Abstract Only **c32**
A. S. Ilinskiy, L. I. Ponomarev, I. V. Berezhnaya, and A. V. Dolgiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 85-86 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The mutual distortions in combined two frequency dipole antenna arrays are analyzed as a function of the thickness and relative positioning of dipoles operating at different frequencies. An electrodynamic model of a two-frequency array incorporating a system of thin half wave dipoles is employed. The amplitude patterns in different subbands are analyzed as a function of the dipole thickness. The results make it possible to represent more fully the distortions occurring in the characteristics of two frequency combined arrays, as well as their relationship with the relative positioning and thickness of radiators operating at different frequencies which, in turn, makes it possible to assess the advisability and prospects for using combined dipole arrays in various radio systems. Author

N85-15056# Joint Publications Research Service, Arlington, Va.
MICROSTRIP ANTENNA FOR MULTICHANNEL RADIOMETER Abstract Only **c32**
S. T. Knyazev, Ye. I. Nefedov, and B. A. Panchenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 9 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 86-87 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A microstrip designed for installation aboard agricultural aircraft as part of a radiometric moisture meter operating in the 2, 18 and 30 bands is described, which provides minimum losses and has no horizontal side lobes. The basic parameters of the experimental array patterns at the center and boundary frequencies of the working bands are given. The use of microstrip radiators makes it possible to implement a moisture meter antenna system with superior operating and electrodynamic characteristics. Author

N85-15057# Joint Publications Research Service, Arlington, Va.
ALGORITHM FOR TRACKING MANUEVERING OBJECT WITH AMBIGUOUS MEASUREMENTS Abstract Only **c32**
In its USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 9 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 3-8 Original language document announced as A84-28061 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A quasi-optimal algorithm for the trajectory tracking of a maneuverable target in the presence of peripheral measurements is described. The method used is an adaptive state-estimation procedure based on a group of Kalman filters operating in parallel. Simulation results are presented. B.J. (IAA)

N85-15058# Joint Publications Research Service, Arlington, Va.
ENERGY PARAMETERS OF OPTICAL RADIATION SPACE RESEARCH SYSTEMS Abstract Only **c74**
K. Ye. Rumyanstev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 10 Transl. into ENGLISH

from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 9-12 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A method for spatial searching for optical radiation modulated by the intensity of the subcarrier is extended to the analysis of search systems employing direct photodetection, using a strip of matrix photodetectors in which the individual elements are sampled sequentially. Formulas are derived which make it possible to compare search systems employing dissector and matrix photodetectors. Author

N85-15059# Joint Publications Research Service, Arlington, Va.
PECULIARITIES OF MICROPROCESSOR IMPLEMENTATION OF ALGORITHMS FOR PROCESSING RADIO SIGNALS AND NOISE IN LARGE ANTENNA ARRAYS Abstract Only **c32**
V. V. Popovskiy and Ye. I. Glushankov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 51-53 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A method for speeding up computational procedures by paralleling the processing algorithms is examined. Two common types of processing algorithms are analyzed: with direct inversion of the sampled covariation matrix, and estimating the weight coefficient vector of the adaptive array by the state variable method. The use of a distributed multiprocessor system to speed up microprocessor operation is described, and the paralleling of the algorithms developed by such a computer system is explained.
Author

N85-15060# Joint Publications Research Service, Arlington, Va.
EFFICIENCY IN INTEGRAL ACTIVE ANTENNAS Abstract Only **c32**
M. I. Kontorovich and N. M. Lyapunova *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 10-11 Transl. into ENGLISH from Radiotekh. (Moscow), no. 4, Apr. 1984 p 86-88 Original language document announced as A84-35769 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

An analysis is made of the noise characteristics of integrated active antennas with feedback. It is shown that the feedback (provided it is negative) leads to an extension of the dynamic range of the system. B.J. (IAA)

N85-15061# Joint Publications Research Service, Arlington, Va.
DISTORTIONS OF RADIO PULSE DURING REFLECTION FROM MAXIMUM REGION OF IONOSPHERIC LAYER Abstract Only **c32**
S. A. Namazov, Yu. I. Orlov, and N. N. Fedorov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 11 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 609-619 Original language document announced as A84-32126 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

An analysis is made of dispersion distortions of radio pulses reflected from an ionospheric-layer maximum region, approximated by a symmetric Epstein profile. The FFT algorithm is used for the calculation, and spatial-temporal geometrical diffraction theory is used to interpret the results. Signal distortion in the far-field approximation is examined, and various methods for determining the group-delay time are considered. B.J. (IAA)

N85-15062# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF POLARIZATION GRIDS MADE OF PARALLEL METAL STRIPS DURING HEMISPHERICAL SCANNING Abstract Only **c32**
L. A. Rud *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 11-12 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v, 29, no. 4, Apr. 1984 p 637-642 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The behavior of the polarization and energy characteristics of waveguide-type blade grids during hemispherical scanning are examined. Near-optimal constructions are defined, and basic factors influencing the performance of the devices are established. Author

N85-15063# Joint Publications Research Service, Arlington, Va.
DISTRIBUTION OF ATMOSPHERIC RADIO INTERFERENCE Abstract Only **c32**
D. S. Dobryak *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 12 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 666-672 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The statistical description of atmospheric radio interference as a random process was investigated. A statistical model for atmospheric interference which has the minimum possible number of model parameters is sought. The instantaneous values of atmospheric interference are found to represent the random sum of normal random quantities. It is found that field intensity of atmospheric interference represents a nonGaussian random process which is fully defined by two generalized parameters: the rate of occurrence of the pulses forming it, and the autocovariation function of that process. The hypothesis that the instantaneous values of atmospheric noise are described by a unidimensional distribution was tested by recording the vertical electrical component of the natural electromagnetic field in the 0.1 25 kiloKHz band experimentally. It is noted that atmospheric interference is fully described by its spectral density and by the intensity of the atmospherics as a random process. E.A.K.

N85-15064# Joint Publications Research Service, Arlington, Va.
ASYMPTOTICALLY OPTIMAL RANKING ALGORITHMS FOR QUASI-DETERMINATE SIGNAL DETECTION Abstract Only **c32**
A. M. Brikker *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 12-13 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 681-690 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The structure of an asymptotically optimal ranking algorithm for quasideterminate signal detection in which the signal has a constant component, the distribution density of the interference of a known type, and the constant component and intensity of fluctuations of the interference unknown are synthesized. Conditions for optimality are defined and analytical expressions for the detection characteristic are obtained. The asymptotic effectiveness of ranking algorithms for cases in which the actual received signal and interference density differ from the expected models was established. The findings relate to quasideterminate signals which are represented as expansions with respect to an orthonormal system of functions with random parameters uniformly distributed on a hypersphere. E.A.K.

N85-15065# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF SPIN ECHO SIGNALS IN MULTI-PULSE EXPERIMENT Abstract Only **c32**
V. I. Dudkin, V. Yu. Petrunkin, and V. I. Tarkhanov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 13 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 732-740 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A method to determine the connection between the parameters of any echo signal and the parameters of the perturbing radio pulses for a paramagnetic substance located in an external heterogeneous magnetic field, disregarding relaxation processes and the form of the magnetic resonance line was examined. Echo signals are classified in the language of Kelly-Klein parameters by using a modified Jensen pattern. The effect of two LFM radio pulses with specified parameters applied to a spin system is analyzed. It is found that different spins contribute to the initial echo signal at different moments, and that there is an additional

shift in the echo signal which depends upon the ratio of the amplitudes of the perturbing pulses. The method can be extended to any multipulse sequences and can be used to examine more complex cases in which allowance for the form of the magnetic resonance line, the relaxation processes and the characteristics of the formation of nuclear spin echo signals in polycrystalline magnetically ordered substances. E.A.K.

N85-15066# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL DETERMINATION OF PROPAGATION RATE OF ELF SIGNALS EMPLOYED BY OMEGA RADIO NAVIGATION SYSTEM FOR PHASE MEASUREMENTS Abstract Only c32
S. I. Kotyashkin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 14 refs Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 795-797 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Determination of the phase velocity along the propagation path of an ELF signal by taking measurements at a single point is discussed. Accurate single-point phase velocity determinations require single-mode propagation of the ELF signal at the receiving point, very small arguments of the excitation coefficients for the two transmitters, a sufficiently long interval of unambiguous measurement results and geodetic-line propagation of the signal over long paths. Experimental measurements of the signals from the Omega radio navigation system at 10.2 KHz during 12-18 May 1981 are described. The data obtained can be used to estimate variations in the effective altitude of the ionosphere during heavy solar activity, and for calibrating the Omega radio navigation system by refining the theoretical phase velocities. Author

N85-15067# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF DEVELOPMENT OF SPACE COMMUNICATION Abstract Only c32
N. T. Petrovich and O. N. Popokhov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 33 Transl. into ENGLISH from Elektrosvyaz (Moscow), no. 3, Mar. 1984 p 25, 44 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

This article summarizes the Fifth All Union Scientific Technical Conference on the problem of development of space communications which was held in September, 1983 at Kaluga. Over 100 reports were delivered in the area of satellite communications networks and their place in the primary consolidated automated communications network. Included were digital transmission methods; antenna devices; radio wave propagation; optical and microwave devices; communications system noise tolerance; synchronization systems; telemetry systems; data transmission; and searching for intelligent life throughout the Universe. The reports, and recommendations based on them, reflect the paths for further development of satellite communications systems. Author

N85-15068# Joint Publications Research Service, Arlington, Va.
COMPUTER INVESTIGATION OF EFFECTS OF HIGH INJECTION IN TRANSISTOR LARGE INTEGRATED CIRCUIT STRUCTURES Abstract Only c33
A. N. Bubennikov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-011) 25 Sep. 1984 p 51 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 76-79 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The effects of collector and emitter base expansion, base conductivity modulation, and static ejection and accumulation of carriers at the periphery of the emitter junction are investigated. The electrical characteristics of a transistor structure are analyzed on a BESM-6 computer by means of unidimensional and two dimensional physical-topological programs. The results can be used to make a valid choice of the electrical mode of transistor structures and elements, and to facilitate normal functioning of LIC with the required speed and without significant degradation of parameters. Author

N85-15069# Joint Publications Research Service, Arlington, Va.
NUMERICAL ESTIMATION OF CHARGE TRANSFER TIME IN CHARGE-COUPLED DEVICE EMPLOYING LATENT GALLIUM ARSENIDE CHANNEL Abstract Only c33
A. I. Prokopyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 51-52 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mat. 1984 p 79-80 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Charge transfer inefficiency is analyzed as a function of time in latent-channel gallium arsenide CCD devices and Schottky-barrier gates for three transfer mechanisms - boundary field, self-induced drift and diffusion. Allowance is made for the drift rate saturation effect, and the relative contribution of each of the three mechanisms to charge transfer is assessed. It is found that allowance for drift rate saturation has an influence on the form of the transfer inefficiency curves. B.W.

N85-15070# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED POWER THYRISTORS WITH EXCELLENT SWITCHING AND LOAD CHARACTERISTICS Abstract Only c33
V. L. Kuzmin, V. M. Kukhamkin, and O. K. Toomla *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-011) 25 Sep. 1984 p 52 Transl. into ENGLISH from Electrotekh. (Moscow), no. 3, Mar. 1984 p 2-5 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A new generation of high-speed power thyristors is being developed, with standard PNPN structure in stud configuration (three diameters 18-24-32 mm with current rating 50-200 A) and in pellet configuration (three diameters 32-40-50 mm with current rating 200-800 A). Branching the control electrode and the internal amplification of the signal raise the safe maximum di/dt and thus improve the load characteristics, but only at frequencies above 1.5 kHz and correspondingly high switching speeds with low turn-on losses. The main design features are in involute control electrode and mesa positioning of the amplifying control electrode, combined with 20 micro m thick Al metallization of cathode and p-base. Design and performance calculations are based on known relations for exponential current rise, power losses, and temperature rise in accordance with the equivalent circuit. These TB and BK thyristors will completely replace existing TCh, TChl, TB devices. Author

N85-15071# Joint Publications Research Service, Arlington, Va.
HIGH-POWER GATE TURN-OFF THYRISTORS Abstract Only c33
R. E. Ayazyan *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 52-53 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 5-11 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A gate turn off thyristor which is a more efficient energy converter than a transistor, but is slower than a transistor and has a larger forward voltage drop than a plain thyristor was examined. High power GTO thyristors were developed. A phenomenological analysis of the turn off process is available. The process is nonuniform and nonsteady, which limits injection and narrows the conducting region laterally. A high power GTO thyristor is an integral structure which consists of very narrow thyristor strips connected in parallel, with cathode n-emitters embedded in the p-base region. It is indicated that optimization of GTO thyristors for efficient turn-off of high anode currents under high voltages requires a large VbdJ1/RB ratio which is attainable through maximization of the emitter doping and minimization of the emitter width. It also requires a low concentration of excess charge carriers stored in the n-base adjacent to the anode p-emitter, attainable by a leakage path in the p-emitter junction J3. The temperature rise during switching, which can be lowered by a damping circuit and accelerate the turn off process and at the same time limit the dV/dt during fall of the anode current. E.A.K.

N85-15072# Joint Publications Research Service, Arlington, Va.
TRENDS IN DEVELOPMENT OF BIPOLAR POWER TRANSISTORS Abstract Only **c33**
V. A. Potapchuk *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 53-54 Transl. into ENGLISH from Elektrotekh. (Moscow) no. 3, Mar. 1984 p 11-14 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Monolithic integrated circuit technology was applied to bipolar power transistors which included Darlington transistors with preamplification. They are produced with two stabilizing resistors and sometimes also with two diodes for higher switching speed and for overvoltage protection respectively. Darlington transistors have higher current gain than plain silicon transistors of the same size so that they are indispensable for inverters. The main trend and corresponding changes in manufacturing methods are toward higher current and voltage ratings for direct connection without step-down transformers. Low voltage transistors with thin low resistivity epitaxial layers have the optimum combination of performance characteristics, while most transistors with rating up to 50 A and 400 V have n-n+ epitaxial structures. Triple diffusion is still more successful than the epitaxial process in producing high current high voltage transistor structures and is the predominant technology. This is attained by increasing the chip size or allotting up to half the chip area to the emitter, at a sacrifice in switching speed because of the larger thickness of active layers and attendant longer lifetime of minority carriers in them. Consequently, bipolar lower transistors for voltages higher than 1000 V are not likely to be produced soon. E.A.K.

N85-15073# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED POWER DEVICES WITH FIELD CONTROL Astract Only **c33**
O. F. Goryunova and V. A. Kuzmin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 54-55 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 15-19 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A generation of high speed power devices is appearing in which some fundamental deficiencies of transistors were overcome. Injection devices with better characteristics are bipolar transistors for high pulse currents but low voltages and for high voltages but low currents with switching frequencies up to 20 kHz. New devices are field effect transistors and electrostatically-controlled thyristors. Field-effect transistors are MOS devices featuring high speed with nanosecond switching time, high input impedance, small control current, and a negative temperature coefficient of drain current. Structurally they are produced with either vertical or horizontal conduction channel, both versions operating by the same principle and their cost still being high. Electrostatically-controlled thyristors are structurally produced with either surface grid or buried grid, the switching characteristics are better but the gain is lower with a surface grid. New devices are compared and it is revealed that GTO thyristors have the highest load capacity and field effect transistors have the highest switching speed. E.A.K.

N85-15074# Joint Publications Research Service, Arlington, Va.
SEMICONDUCTOR HIGH-VOLTAGE POWER DEVICES: STATE OF ART AND OUTLOOK Abstract Only **c33**
K. D. Boronin, Yu. A. Yevseyev, Yu. M. Loktayev, N. A. Sobolov, V. M. Tuchkevich, and V. Ye. Chelnokov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 55-56 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 19-21 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A survey of data on existing superhigh voltage silicon devices indicates the feasibility of such devices with a breakdown voltage as high as 5 kV at a forward current density of the order of 100 A/sq cm when designed for a switching time not exceeding 300 to 500 micros and a forward voltage drop not exceeding 2 to 2.5 V. It is indicated that it is possible to improve the ratings, specifically to raise the breakdown voltage into the 10-20 kV range. This can be achieved by several methods: better purification of raw silicon and its neutron doping so as to minimize the variance of electrical resistivity; ensuring retention of its electrophysical properties during subsequent technological treatment; regulating the lifetime of charge carriers by irradiation; and regulating their surface concentration. All these methods utilize the physical characteristics of a p+nnp+-structure, particularly dependence of the forward current voltage characteristic and the switching speed of silicon devices on the dimensions of this structure and on the charge concentration profile in it. E.A.K.

N85-15075# Joint Publications Research Service, Arlington, Va.
NEW METHODS OF FAST SWITCHING OF HIGH POWER BY MEANS OF SEMICONDUCTOR DEVICES Abstract Only **c33**
I. V. Grekhov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 56-57 Transl. into ENGLISH from Elektrotekh., no. 3, Mar. 1984 p 21-25 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

New concepts of fast high power switching and three new devices were developed. The silicon power thyristor, the most suitable device for microsecond switching, features uniform and simultaneous injection of excess charge carriers into the base regions to ensure optimum switching over the entire active area, with a concentration of excess charge carriers much higher than the minimum necessary for triggering so as to prevent pinch off. The silicon power optothyristor, with an electron hole plasma built up directly in the space charge region of the collector junction by action of a neodymium laser. The emitter with metallized contact, which occupies the upper surface of the thyristor structure, are a few thousand pinhole windows with a total area approximately half the active surface area. The laser pulse impinging on the entire surface causes plasma columns to form simultaneously under all windows so that the current can spread over the entire p+-emitter. The fast-recovery drift diode, connected in parallel with the load and acting as a pulse peaking circuit, has also a much lower power capacity. Application, in quick succession a quasisteady reverse bias voltage and a rising pulse in the same direction prevents impact ionization. E.A.K.

N85-15076# Joint Publications Research Service, Arlington, Va.
GALIUM-ARSENIDE POWER DEVICES Abstract Only **c33**
Zh. I. Alferov, V. M. Tuchkevich, and V. Ye. Chelnokov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 57 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 25-28 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Available data indicate the feasibility of producing GaAs power devices much smaller in volume and mass than silicon devices of the same power rating, with a much shorter switching time. This is attributable to the higher critical electric field intensity for breakdown of GaAs junctions and the correspondingly higher concentration of the majority-carrier N-impurity. The governing factor is the effective thickness of the p-base, smaller than that of the n-base in silicon structures and comparable GaAs structures or equal to it in GaAs structures with symmetric bases. Estimates for GaAs diodes with p(+)pnn(+)-structures indicate a forward voltage drop not exceeding 2.1 V at a current density of 750 A/sq cm in 80% of devices with W/L = 3. Factors favoring further development of GaAs devices in preference to silicon devices are not only higher current densities and correspondingly smaller dimensions as well as more ideal switching and transient characteristics but also much lower temperature and much shorter time of the epitaxial process. R.S.F.

N85-15077# Joint Publications Research Service, Arlington, Va.
INTEGRATED POWER DEVICES WITH THREE-DIMENSIONAL CONNECTION FOR AUTOMATION SYSTEMS Abstract Only **c33**
I. A. Liniychuk, A. A. Strashnov, and V. S. Zelisko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 58 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 28-30 (For primary document see N85-15042

06-31)
Avail: NTIS HC A07/MF A01

Two integrated semiconductor power devices utilizing the physical characteristics of three-dimensional processes in PNPN structures during switching are the multiposition switch and the forwistor. The former is a chain of PNPN elements closely spaced apart in a single chip with three-dimensional coupling. In the multiposition switch the density of the tangential control current increases with increasing current in the ON element until that current reaches its critical level for switching. In the forwistor a control current pulse turns on the first section and then the other. The forwistor is switched off by reversal of the polarity of the applied voltage. This device can be used as amplitude-to-time converter. Its numerous applications as a simple and reliable device in automatic control systems include secondary power supplies, triple-loop voltage regulation, two-step power regulation, protection of primary and secondary power supplies, inspection and fault indication. R.S.F.

N85-15078# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF TECHNOLOGY OF SILICON SINGLE-CRYSTAL PRODUCTION SEMICONDUCTOR POWER DEVICES: STATE OF ART OUTLOOK Abstract Only **c76**
I. N. Voronov and P. M. Grinshteyn *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 59 Transl. into ENGLISH from Elektrotek. (Moscow), no. 3, Mar. 1984 p 30-34 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Over 75% of all semiconductor silicon is produced by the Czochralski process. These silicon single crystals have a high oxygen and carbon content, however, so that the trend is toward the floating-zone process. Other recently developed processes for subsequent treatment are neutron transmutation doping of silicon with prosphorus in order to ensure a high uniformity of electrophysical properties needed in high-voltage devices. The inevitable radiative defects from these processes must be subsequently cured by annealing. This technology imposes stringent requirements on the silicon material as well as on both the doping and annealing processes. Research on optimization of the doping process indicates that a highly sterilized water-graphite channel reactor using uranium fuel is the most suitable facility for this purpose. Optimization of the post-irradiation annealing process has not yet been finalized. An important factor in further developments is accurately and reliably determining macro- and micro-inhomogeneities in doped material. R.S.F.

N85-15079# Joint Publications Research Service, Arlington, Va.
CURRENT-VOLTAGE CHARACTERISTICS OF SEMICONDUCTOR POWER DEVICES OPERATING AT HIGH CURRENT DENSITIES Abstract Only **c33**
V. A. Kuzmin and T. T. Mnatsakanov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 62 Transl. into ENGLISH from Elektrotek. (Moscow), no. 3, Mar. 1984 p 39-44 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The forward current voltage characteristics of semiconductor power devices was analyzed, taking into account consequences of high current density at which modern devices operate. The analysis was based on the equation of diffusion for the phenomenological model, with the recombination rate depending on the Auger constants and on the Schottky-Reed lifetime statistics. It is solved here for diodes with p(+)nn(+) structure. Calculations reveal that the voltage drop across the base layer depends largely on the ratio of lifetimes of injected charge carriers in the base and in the emitter. The results indicate that at high current densities it is Auger recombination rather than electron hole scattering which determines how linear the forward current voltage characteristic of devices with wide base structure will be. R.S.F.

N85-15080# Joint Publications Research Service, Arlington, Va.
ALLOWABLE SURGE CURRENTS AND FAILURE MECHANISMS IN SEMICONDUCTOR POWER DEVICES IN VARIOUS MODES OF OPERATION Abstract Only **c33**
V. A. Kuzmin, V. I. Mamonov, and Yu. A. Chesnokov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 63 Transl. into ENGLISH from Elektrotek. (Moscow), no. 3, Mar. 1984 p 43-47 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Because the allowable surge current in a semiconductor power device is determined by heating, it must be related to the allowable temperature and the latter must be calculated first. This is done for devices with pressure contacts on the basis of the corresponding system of two differential equations of transient heat conduction, one for the silicon crystal and one for the metal components. Calculations were made by this method for T-630 thyristors with pellet construction and pressure contacts. Such contacts are found to strongly inhibit heating under a half sine current surge. Conditional failure of thyristors such as spurious switching because of one or several parameters temporarily exceeding allowable limits as a result of a temperature rise is evaluated on this basis. Failure caused by the surge current following application of a reverse voltage is evaluated from the standpoint of the breakdown mechanism. Failure caused by a forward surge current in high injection devices such as p-i-n diodes is evaluated from the standpoint of the current filamentation mechanism and resulting perforation of the structure by melting. R.S.F.

N85-15081# Joint Publications Research Service, Arlington, Va.
SEMICONDUCTOR SUBMICROSECOND POWER COMMUTATOR SWITCHES Abstract Only **c33**
V. I. Brylevskiy and A. F. Kardo-Sysoyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 64 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 51-54 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

Increasing the capacity of existing pulse thyristors capable of commutating currents up to 100 A under a voltage of 1 kV to 1 MW of pulse power at a pulse rise time of 100 ns or shorter involves either decreasing the load resistance, although below 1 ohm the switching time increases excessively because of the finite parasitic circuit inductance, or increasing the initial applied voltage. In the latter case maximum switching speed is attained by preventing localization of the current during the turn-on transient period. Turn-on by a momentary overvoltage (in the statistical sense) pulse is preferable. In this case, impact ionization and the conductive component of the current provide the necessary action, while the capacitive current component is ineffective. Experiments confirm that combining such an overvoltage pulse with suppression of dynamic current localization can raise the current capacity of submicrosecond switching thyristor series chains by at least two orders of magnitude. A.R.H.

N85-15082# Joint Publications Research Service, Arlington, Va.
TWO-ROTOR ALTERNATORS WITH SUPERCONDUCTOR FIELD WINDING Abstract Only **c33**
Ye. Ya. Kazovskiy and V. Ye. Sigayev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 65 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 60-63 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

A two rotor construction was proposed for synchronous a.c. machines with superconductor field windings, as a means of physically separating hot components from cold components and thus minimizing the heat leakage to the cold component with a resulting more efficient cryogenic cooling of the latter. The two rotors are mounted on the common shaft, coaxially in separate bearings. A hot working rotor with shorted winding or field winding and freely running cold rotor with superconductor field winding and a cold working rotor with superconductor field winding and freely running hot rotor, usually in the form of a hollow conducting cylinder are described and comparatively evaluated here for starting and running performance. A.R.H.

N85-15083# Joint Publications Research Service, Arlington, Va.
AUTOMATIC CORRECTION OF STATIC CHARACTERISTICS OF MEASUREMENT CHANNEL OF DIGITAL OSCILLOGRAPH c35
A. M. Berkutov and Yu. D. Matyukhin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 66-72 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Prib. (Leningrad), v. 27, no. 4 p 3-8 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The measurement channel of a digital oscillograph is examined and a method is proposed for correcting its static characteristic. As a mathematical model of the static characteristic it is proposed to use a piecewise polynomial interpolant based on a Newton polynomial and a three point cubic spline. The definition of the three point cubic spline and a formula for the residual member (without derivation) are given. An example is cited in order to illustrate the effectiveness of the correction. Author

N85-15084# Joint Publications Research Service, Arlington, Va.
A NOISE-SUPPRESSING DIGITAL FREQUENCY METER c35
V. S. Gutnikov and A. I. Bukman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 77-82 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Prib. (Leningrad), v. 27, no. 4, Apr. 1984 p 8-12 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

The structure and properties are considered of a digital frequency meter, which reproduces in the measurement process a special graduated weighting function with whole number coefficients. This suppresses the additive noise present in the input signal of the frequency sensor connected to the input of the frequency meter. Author

N85-15085# Joint Publications Research Service, Arlington, Va.
QUALITY CONTROL OF INTEGRATED CIRCUITS BY PARAMETRIC IDENTIFICATION METHODS Abstract Only c33
F. N. Pokrovskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 111 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 90-93 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

An approach to quality assessment is described which incorporates the advantages of two separate methods: checking for the execution of assigned functions by criterial characteristics, and physical methods. The proposed approach is based on the fact that changes in the properties of integrated circuit materials are reflected more strongly in variations of the parameters of equivalent elements than in the values of external characteristics. The conditions under which a parametric identification problem has a unique solution are established. The procedure can be employed directly for circuits containing only passive elements. Circuits which incorporate dependent sources are analyzed by finding the absolute values of the parameters first, and then establishing their sign in accordance with a substitution circuit. The use of the method for quality control of a series 249 integrated circuit and a 36 item sample of 249LPIB integrated circuits. The accuracy of the parametric identification indicates that a unique solution is achieved, and the quality control procedure can be implemented. Author

N85-15086# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PROCESS MODELING APPLIED TO METAL FORMING AND THERMOMECHANICAL PROCESSING
Loughton (England) Sep. 1984 161 p refs Lectures held in Oslo, 15-16 Oct. 1984, in Paris, 18-19 Oct. 1984, and in Lisbon, 22-23 Oct. 1984
(AGARD-LS-137; ISBN-92-835-1477-7) Avail: NTIS HC A08/MF A01

New perspectives to advance metal forming and thermomechanical processing were discussed. Working and forming processes are viewed as systems which integrate component behavior such as workpiece flow, heat flow and friction at the workpiece, tooling interface, and microstructural evolution. These are combined to form a system process model using deformation mechanics. Extrusion, forging, rolling, and sheet forming processes are examined and specific results for light metals, steels and superalloys, finite element methods and related aspects of computer-aided process design are presented. For individual titles, see N85-15087 through N85-15096.

N85-15087# Wright State Univ., Dayton, Ohio. Materials Science and Engineering.
FLOW-BASED ANALYSES OF METAL DEFORMATION PROCESSES: AN OVERVIEW
Joseph F. Thomas, Jr. *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 18 p refs (For primary document see N85-15086 06-31)
(Contract F33615-78-C-5025; Grant NSF DMR-80-15341)
Avail: NTIS HC A08/MF A01

Flow based analysis of metal deformation processing provides a new design perspective to assess optimum process variables and workpiece material behavior. Components of flow based analysis include finite element computation of process mechanics, realistic constitutive equations for workpiece plastic flow, and analytical models for workability during processing. Process requirements such as press loads and maximum limiting strains are determined by process variables such as temperature and performance design. In principle the strain history of each element in the workpiece can be determined and used to predict the distribution of properties within the product. The material characterization necessary to implement flow based analysis is illustrated for the hot forging behavior of the high strength aerospace titanium alloy, Ti-6242. E.A.K.

N85-15088# Central Inst. for Industrial Research, Blindern (Norway).
MICROSTRUCTURE, TEXTURE AND FORMABILITY OF THIN ALUMINIUM SHEETS
Bjoern Andersson and J. E. Tibballs *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 19 p refs Sponsored by Royal Norwegian Council for Scientific and Industrial Research (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

The modelling of the microstructural changes of thin aluminum sheets at each production stage and to link the models corresponding to given process routes were considered. The continuous casting of commercial aluminum and of AlMn(Mg) was outlined. Prediction of microstructural parameters from process variables were depended on systematical characterization of the alloys. The kinetics of the precipitation reactions followed reaction rate theory provided that correct precipitation reactions and nucleation mechanisms were used. The texture development which followed the general trends outlined in the Taylor model during coldrollings was examined. The texture is found to follow simple mathematical expressions and parameters for the rate of increase and the level of the texture strength is related to the structure. The grain size depends on primary particles and precipitation reaction and the necessary relations can be formulated. E.A.K.

N85-15089# Institut National Polytechnique, Grenoble (France). Genie Physique et Mecanique des Materiaux.
PREDICTION OF FORMING LIMIT DIAGRAMS FOR DEEP DRAWING
B. Baudelet *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process Sep. 1984 22 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

Different theoretical approaches to determination of the forming limit diagrams at necking and rupture while considering the influence of the constitutive law, surface defects and evolution of volume damage are presented. The use of steels of increasing strength and decreasing thickness is associated with different forming problems such as spring back, surface deflections, low forming limit. The optimization in the use of these materials through careful modelling of sheet metal forming is discussed. E.A.K.

N85-15090# National Aeronautical Establishment, Ottawa (Ontario). Structures and Materials Lab.
THE ROLE OF MICROSTRUCTURE IN THE MODELLING OF PLASTIC FLOW IN P/M SUPERALLOYS AT FORGING TEMPERATURES AND STRAIN RATE
J.-P. Immarigeon *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 30 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

The application of computer aided plasticity analysis to model the deformation of alloys during forging with a view to optimizing the microstructure in forged components is presented. Finite element modelling techniques and a methodology for predicting local changes in grain size as a function of local deformation history predict the final grain sizes in the rim and the bore regions of a disc via process modelling and determines the processing conditions under which an optimum microstructure is produced. The effects of thermomechanical history on the evolution of microstructure in P/M superalloys under isothermal forging conditions and formulation of physically realistic constitutive relations for plastic flow which quantify the effects of the microstructural evolution, thereby allowing the prediction of final microstructure in forgings were studied. Using constant true strain rate uniaxial compression tests, microstructure flow property data were generated at isothermal foring temperatures and strain rates for a number of compacts. Deformation modelling for microstructural control is discussed. It is shown that the rate of change of grain size is an important parameter which governs changes in flow strength and is considered in the formulation of constitutive relations for compacts both in a coarse grained and in a fine grained superplastic condition. A deformation model for grain size and rate sensitive P/M superalloys and a methodology that can be applied to predict grain size distributions in forgings are presented. E.A.K.

N85-15091# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Materials Lab.
CONTROL OF MICROSTRUCTURE DURING HOT WORKING OF TI-6242
H. L. Gegel, Y. V. R. K. Prasad, S. M. Doraivelu, J. C. Malas, J. T. Morgan, K. A. Lark, and D. R. Barker *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 11 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

A new method of modeling the dynamic material behavior which explicitly describes the dynamic metallurgical processes occurring during hot deformation is presented. The approach in this method is to consider the workpiece as the only part of the total processing system which dissipates power and to evaluate the dissipated power co-content J from the constitutive equation. The optimum processing conditions of temperature and strain rate are those corresponding to the maximum or peak in J. It is shown that J is related to the strain-rate sensitivity (m) of the material and reaches a maximum value (J sub max) when m = 1. The efficiency of the power dissipation (J/J sub max) through metallurgical processes is shown to be an index of the dynamic behavior of the material and is useful in obtaining a unique combination of temperature and strain rate for processing and also in delineating the regions of internal fracture. In this method of modeling, no a priori knowledge or evaluation of the atomistic mechanisms is required, and the method is effective even when more than one dissipation process occurs, which is particularly advantageous in the hot processing of commercial alloys having complex microstructures. This method has been applied to the modeling of the behavior of Ti-6242 during hot forging. The behavior of (alpha + beta) and beta perform microstructures has been examined, and the results show that the optimum condition for hot foring of these performs is obtained at 927 C (1200 K) and a strain rate of 10 to the minus 3rd power/sec. Variations in the efficiency of dissipation with temperature and strain rate are correlated with the dynamic microstructural changes occurring in the material. Author

N85-15092# Porto Univ. (Portugal).
NUMERICAL METHODS IN METALFORMING
Nuno Rebelo *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process Sep. 1984 16 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

At the very heart of metal forming analysis is the theory of plasticity. A brief description of this theory is given. The infinitesimal theory of plasticity, simplified by discarding the elastic part of deformation (also known as the flow theory) has produced several approximate methods of analysis that have proved very useful in metal forming. The basic assumptions are presented that lead to the uniform deformation method, the slab method, the upper-bound method and the slip-line field method. The availability of computers with relatively inexpensive, large amounts of number-crunching capabilities fostered the development of the finite element method. Originally used in structural analysis, it rapidly expanded into other fields, and has been applied to metal forming analysis since the early seventies. This is the area in which most of the recent work in this field has been done. The first one is based on the rigid plastic approach (the flow theory) for which the infinitesimal theory of plasticity has been sufficient. It leads to relatively simple formulations which have allowed its users to attack the difficult problems specific to metal forming applications. The second one is based on the more complete elasto-plastic approach which almost always requires a large deformation theory of plasticity. The formulations are more complicated and have followed, if not actually led to, development in the theory itself. This reports ends with an introduction to the fundamental concepts of the finite element method. B.W.

N85-15093# Porto Univ. (Portugal). School of Engineering.
FINITE ELEMENT SIMULATION OF FORGING PROCESSES
Nuno Rebelo *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 16 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

A finite element formulation is presented for rigid-thermoviscoplastic metal forming analysis. The actual theories will only be referenced to make space for the finite element equations themselves and for the algorithms that allow one to follow a deformation process by time steps. The great advantage of finite-element is that once the program is written, one can change the geometry of the problem completely by merely changing the input data. Therefore we advance our knowledge by classes of difficulties instead of by specific applications. The rigid-plastic formulation has proven accurate and robust enough for one to be able to dedicate oneself to the specific problem of metal forming. These problems will be reviewed here in the context of forging. B.W.

N85-15094# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Materials Lab.
COMPUTER-AIDED DESIGN OF EXTRUSION DIES BY METAL-FLOW SIMULATION
H. L. Gegel, J. C. Malas, J. S. Gunasekera, J. T. Morgan, S. M. Doraivelu, M. Whitaker, ed. (Systems Research Lab., Inc.), and H. L. Henrich, ed. (Systems Research Lab., Inc.) *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 8 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

A general-purpose, thermoviscoplastic finite-element program called ALPID has been combined with advanced CAD/CAM techniques for die design. A die-design package was used for generating the coordinates of the billet/workpiece and die geometries. This geometric data base was integrated along with the constitutive material-behavior model and interface-effects model into the analysis package, and many simulations were carried out for extrusion processes. Metal-flow simulations were obtained for different die geometries such as conventional shear dies of 80 deg., conical dies, and streamlined dies having different die lengths and extrusion ratios in order to study the effect of die geometry upon metal flow during extrusion and also to achieve uniform strain distribution for controlling the final microstructure and shape of the component without forming defects. Experimental

results are also presented along with analytical predictions for the purpose of demonstrating the capability, accuracy, and efficiency of the finite-element analysis and application of these techniques to the solution of industrial problems in these areas. Interfacing of quality control, group technology, and economic analysis to process and geometric modeling is also discussed for the benefit of the extrusion industry presently in the process of implementing this technology. Author

N85-15095# Sheffield Univ. (England). Dept. of Metallurgy.
MODELLING TEMPERATURE CHANGES DURING HOT WORKING OPERATIONS
C. M. Sellars *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 8 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

Finite difference methods have been applied to determine radial heat transfer in round billets under conditions of hot extrusion, and in flat slabs during hot rolling. The principles of the computing procedures are outlined, together with the approximations adopted to eliminate iterative procedures and to obtain an accurate estimate of the surface temperature as well as of the temperature of the internal elements. In both situations, heat transfer coefficients at the surface have been determined experimentally and these coefficients can then be applied to other geometrical conditions to give excellent agreement with observation. Author

N85-15096# Sheffield Univ. (England). Dept. of Metallurgy.
MODELING MICROSTRUCTURAL CHANGES DURING HOT ROLLING OF STEELS c26
C. M. Sellars *In* AGARD Process Modeling Appl. to Metal Forming and Thermomech. Process. Sep. 1984 9 p refs (For primary document see N85-15086 06-31)
Avail: NTIS HC A08/MF A01

Commercial hot rolling operations take place in a series of passes, each of which may impose a different strain and strain rate on the steel and may take place at different time intervals and temperature from other passes. Each of these individual deformation variables influences the structural changes that take place during deformation and after deformation, as material travels from one pass to the next. Quantitative equations have been developed to describe their effects on the rate of recrystallization between passes, on the recrystallized grain size produced and on the rate of subsequent grain growth. The way in which these equations can be used to model the evolution of microstructure is discussed for both plate rolling and hot strip rolling. The results of the modelling are shown to give good quantitative agreement with experimental observations on carbon-manganese steel and on austenitic stainless steel. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N85-15097 British Broadcasting Corp., Kingswood (England). Engineering Div.
TELETRACK: A SPECIAL EFFECT
R. Storey Sep. 1984 15 p refs
(BBC-RD-1984/10) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

The theory of operation of a television special effects processors called Teletrack, which is broadly similar to a system developed by CBS is described. The factors involved in the design of a Teletrack processor are outlined and the operation of two preferred forms is described in detail along with the special considerations required for operation on composite PAL signals. Teletrack was the forerunner of a whole family of special effects processors, made possible by the flexibility and precision of digital signal processing. It was first used in the BBC Television Service in 1980, and is available in special effects equipment manufactured by Quantel Ltd. Author

N85-15098*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SCATTERING FROM THIN DIELECTRIC DISKS
D. M. LeVine, A. Schneider, R. H. Lang, and H. G. Carter Sep. 1984 27 p refs
(NASA-TM-86155; Rept-85B0124; NAS 1.15:86155) Avail: NTIS HC A03/MF A01 CSCL 20N

A solution was obtained for scattering from thin dielectric disks by approximating the currents induced inside the disk with the currents which would exist inside a dielectric slab of the same thickness, orientation and dielectric properties. This approximation reduces to an electrostatic approximation when the disk thickness, T, is small compared to the wavelength of the incident radiation and the approximation yields a conventional physical optics solution when the dimension, A, characteristic of the geometrical cross section of the disk (e.g., the diameter of a circular disk) is large compared to wavelength. When the ratio A/T is sufficiently large the disk will always be in one or the other of these regimes ($T << \lambda$ or $kA >> 1$. Consequently, when A/T is large this solution provides a conventional approximation for the scattered fields which can be applied at all frequencies. As a check on this conclusion, a comparison was made between the theoretical and measured radar cross section of thin dielectric disks. Agreement was found for thin disks with both large and small values of kA. M.G.

N85-15099*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEMAND FOR SATELLITE-PROVIDED DOMESTIC COMMUNICATIONS SERVICES UP TO THE YEAR 2000
S. Stevenson, W. Poley, J. Lekan, and J. Salzman Nov. 1984 43 p refs
(NASA-TM-86894; E-2367; NAS 1.15:86894) Avail: NTIS HC A03/MF A01 CSCL 17B

Three fixed service telecommunications demand assessment studies were completed for NASA by The Western Union Telegraph Company and the U.S. Telephone and Telegraph Corporation. They provided forecasts of the total U.S. domestic demand, from 1980 to the year 2000, for voice, data, and video services. That portion that is technically and economically suitable for transmission by satellite systems, both large trunking systems and customer premises services (CPS) systems was also estimated. In order to provide a single set of forecasts a NASA synthesis of the above studies was conducted. The services, associated forecast techniques, and data bases employed by both contractors were examined, those elements of each judged to be the most appropriate were selected, and new forecasts were made. The demand for voice, data, and video services was first forecast in fundamental units of call-seconds, bits/year, and channels, respectively. Transmission technology characteristics and capabilities were then forecast, and the fundamental demand converted to an equivalent transmission capacity. The potential demand for satellite-provided services was found to grow by a factor of 6, from 400 to 2400 equivalent 36 MHz satellite transponders over the 20-year period. About 80 percent of this was found to be more appropriate for trunking systems and 20 percent CPS. M.G.

N85-15100# Coastal Engineering Research Center, Vicksburg, Miss.
STATISTICAL ANALYSIS OF VISUAL WAVE OBSERVATIONS AND GAGE/RADAR MEASUREMENTS Final Report
M. Perlin Jul. 1984 53 p
(AD-A146358; CERC-MP-84-6) Avail: NTIS HC A04/MF A01 CSCL 08/3

This report presents results of a study conducted to determine the variability of observations made simultaneously by several different observers, to compare those observations with instrument measurements when available, and to look at the

temporal variation of observed littoral conditions over a 25-hour period. Littoral Environment Observations (LEO) taken by individual observers were compared with the means of the observations obtained by all observers and with instrument-recorded data when available for a particular variable. Statistical analyses were performed for the different LEO variables to determine the following: (1) confidence intervals; (2) correlation coefficients; (3) standard deviations; (4) consistency between observer and gage; (5) effect of tides on estimation of parameters (i.e., did the estimates depend on the distance between observer and waves?); and (6) the statistical wave height to which LEO wave heights should be compared. The field experiment was conducted at Duck, North Carolina, at the Field Research Facility (FRF) of the Coastal Engineering Research Center on 15-16 August 1978. Six observers simultaneously recorded hourly LEO observations. Concurrent wave measurements were made from the FRF pier with gages and radar. GRA

N85-15101# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
THE EFFECT OF AIRCRAFT GENERATED ELECTROMAGNETIC INTERFERENCE (EMI) ON FUTURE AVIONICS SYSTEMS: A COMPENDIUM
W. E. Larsen, ed. and N. O. Rasch Apr. 1984 327 p Proceedings of Conf. held in Seattle, 19-21 Oct. 1982
(AD-A146380; DOT/FAA/CT-84/9) Avail: NTIS HC A15/MF A01 CSCL 20/14

There are various commercial standards and specifications which are aimed at making aircraft compatible with a hostile electromagnetic environment. However, most of these standards and specifications were developed for analog circuitry; before the advent of high-speed flight critical digital systems. These standards must now be reengineered to accommodate the new technology of composites and sensitive integrated micro-electronic architectures. Modern aircraft are experiencing many cases of flights into or near heavy electromagnetic fields from various sources such as lightning, switching of heavy aircraft electrical loads, or radio transmissions during their life span. This EMI environment has caused and is causing hazardous incidents to aircraft by impairing the normal operation of some flight-critical and flight-essential equipment. Special precautions must also be taken to protect this sensitive digital avionics during maintenance operations. For this reason these standards and specifications must be revised and new design, manufacturing, and testing methods introduced. GRA

N85-15102# Polytechnic Inst. of New York, Brooklyn.
A NEW LEAKY WAVE ANTENNA FOR MILLIMETER WAVES BASED ON THE GROOVE GUIDE Interim Report
P. Lampariello and A. A. Oliner Jun. 1984 56 p
(Contract F19628-81-K-0044)
(AD-A146428; RADC-TR-84-123) Avail: NTIS HC A04/MF A01 CSCL 09/5

Leaky wave antennas for millimeter waves face two main problems. The first relates to the small wavelengths involved, which require small waveguide dimensions and pose fabrication difficulties. The second problem is higher metal loss. In the new leaky wave antenna described and analyzed here, we overcome the first of these problems by choosing a structure with a longitudinally continuous aperture, and the second by basing the antenna on a low-loss waveguide, the groove guide. The groove guide is an open waveguide, but its dominant mode is purely bound by virtue of structural symmetry. By placing a longitudinal asymmetric metal strip along the guide, the symmetry is distributed and a new TEM-like mode is produced in the transverse direction that propagates to the open end and leaks power away. An accurate theoretical analysis is presented for the performance properties of this antenna structure. The cross section is represented by a transverse equivalent network that contains some subtle features. All of the elements of this transverse network are obtained in closed form, so that the dispersion relation for the propagation characteristics is likewise in closed form. GRA

N85-15103# Naval Ocean Systems Center, San Diego, Calif.
A COMPARISON OF EVAPORATION DUCT MODELS FOR IREPS (INTEGRATED REFRACTIVE EFFECTS PREDICTION SYSTEM) Final Report, Oct. 1983 - Apr. 1984
W. Patterson Jun. 1984 68 p
(AD-A146471; NOSC/TR-960) Avail: NTIS HC A04/MF A01 CSCL 20/14

An evaluation of current meteorological measurement techniques to determine adequate description of the surface meteorological processes used to infer evaporation duct height includes a comparison of relative performance, sensitivities to meteorological inputs, and ease of computation for several standard evaporation duct height models. EM wave propagation pathloss models are compared and evaluated, and a maximum range of detection error is determined for the modified NOSC propagation model employed by the Integrated Refractive Effects Prediction System (IREPS). GRA

N85-15104# Naval Research Lab., Washington, D. C.
BROADBAND PILLBOX ANTENNAS Interim Report
J. B. L. Rao and B. D. Wright 21 Sep. 1984 38 p
(AD-A146569; AD-E000601; NRL-MR-5414) Avail: NTIS HC A03/MF A01 CSCL 17/9

The possibility of designing very broadband pillbox antennas has been demonstrated. It was also shown that the operating bandwidth of the existing IFF (pillbox) antenna, AS 1065/UPX, can be improved by a simple modification of the existing feed. Additional modifications are suggested to further improve the performance at the low frequency end. GRA

N85-15105# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
A PERSPECTIVE ON MULTIACCESS CHANNELS
R. G. Gallager Sep. 1984 80 p
(Contract N00014-84-K-0357; DARPA Order 3045)
(AD-A146606; LIDS-P-1404) Avail: NTIS HC A05/MF A01 CSCL 09/4

The Information Theoretic Approach and the Collision Resolution Approach to Multiaccess Channels are reviewed in terms of the Underlying Communication Problems that both are modelling. The author gives some perspective on the strengths and weakness of these approaches and argues for the need of a more combined approach focused on coding and decoding techniques. Author (GRA)

N85-15106# Naval Postgraduate School, Monterey, Calif.
INFORMATION-THEORETIC PROPERTIES OF LANGUAGES AND THEIR GRAMMARS
B. J. MacLennan Aug. 1984 53 p
(AD-A146688; NPS52-84-010) Avail: NTIS HC A04/MF A01 CSCL 12/1

This document describes means for computing a number of information-theoretic properties of languages and their grammars. For example, the entropy of a system of symbols is widely recognized as a measure of that system's complexity and organization. It is shown how the entropy of a language can be computed in a simple way from a grammar annotated with production probabilities. The author then develops means for statistically estimating these production probabilities from measureable properties of strings in the language. He also considers the computation of other information theoretic properties of language and grammars, such as the average information born by a symbol in a language and the average information used by the productions of a grammar. Author (GRA)

N85-15107# Department of the Army, Washington, D. C.
A SINGLE OPTICAL FIBER TELEPHONE SYSTEM Patent Application
N. W. Feldman, inventor (to Army) Filed 6 Sep. 1984 27 p
(AD-D011293; US-Patent-Appl-SN-647767) Avail: NTIS HC A03/MF A01 CSCL 17/2

A hybrid telephone system comprising a plurality of optical telephones and a plurality of electrical telephones all connected

to a conventional central office is discussed. The optical telephones are all provided with opto-electrical interface units co-located with the central office, for converting optical signals received from the optical telephones to electrical telephone signals, and for converting electrical telephone signals from said central office to optical signals for transmission to the optical telephones. The optical telephones are connected to the interface units by means of a single optical fiber which carries both directions of traffic as well as supervisory signals at one of two wavelengths. The optical telephone include means for separating these two wavelengths as well as opto-acoustic and acousto-optic converters.
Author (GRA)

N85-15108# Harry Diamond Labs., Adelphi, Md.
THE HEMP (HIGH-ALTITUDE ELECTROMAGNETIC PULSE) RESPONSE OF A LONG TRANSMISSION LINE BURIED IN THE EARTH
R. P. Manriquez, R. J. Reyzer, and J. F. Sweton Sep. 1984 22 p
(Contract MIPR-HC1001-3-401)
(AD-A146517; HDL-TR-2051) Avail: NTIS HC A02/MF A01 CSCL 20/14

This paper documents the calculation of the current coupled to a long, buried, insulated cable excited by a horizontally polarized plane-wave electromagnetic pulse (EMP) field. This result is compared to the current measured on a similar long, buried cable located approximately 800 ft from a radiating, horizontally polarized EMP simulator having the same driving horizontal field. Originator-assigned key words include: Transmitted E field below ground, Conductivity, Dielectric constant, Distributed source, and Matrix tridiagonalization. GRA

N85-15109# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
US OBJECTIVES GENERALLY ACHIEVED AT BROADCASTING SATELLITE INTERNATIONAL CONFERENCE. IMPROVEMENTS CAN HELP IN FUTURE CONFERENCES
2 Aug. 1984 42 p
(PB84-235316; GAO/RCED-84-157; B-215654) Avail: NTIS HC A03/MF A01 CSCL 17B

The implementation of broadcasting satellite service for the Western Hemisphere was planned. Broadcasting satellites transmit television programs and other information services from Earth orbit to home or office antennas. At the request of the Senate Appropriations Subcommittee on Commerce, Justice, State and the Judiciary, GAO reviewed conference results as compared to established conference objectives and examined the interagency coordination of U.S. participation in this international conference. The United States basically achieved its two most important conference objectives: adopting a technically and procedurally flexible plan for broadcasting satellite service and obtaining a sufficient allocation of satellite orbit slots and frequencies to meet domestic needs. The U.S. was unable, however, to obtain agreement on adopting a maximum signal power level for satellites. The Department of State could improve its preparation, internal coordination, and administrative support for future international conferences and recommends actions to the Secretary of State to improve its international telecommunications activities. GRA

N85-14993# Joint Publications Research Service, Arlington, Va.
PLACE OF APERTURE SYNTHESIS IN GENERAL THEORY OF ANTENNAS (REVIEW) Abstract Only
L. D. Bakhrakh and O. S. Litvinov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1323-1334 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-14994# Joint Publications Research Service, Arlington, Va.
METHOD OF APERTURE SYNTHESIS: FUNDAMENTAL RELATIONS AND DATA PROCESSING IN APERTURE SYNTHESIS SYSTEMS (REVIEW) Abstract Only
V. I. Turchin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 2-3 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1335-1344 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-14995# Joint Publications Research Service, Arlington, Va.
APERTURE SYNTHESIS (REVIEW) Abstract Only
L. R. Kogan and L. I. Matveyenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 3 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1345-1356 Original language doc. previously announced in IAA as A84-20804 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-14996# Joint Publications Research Service, Arlington, Va.
INTERFEROMETRY WITH DECAMETRIC WAVES (REVIEW) Abstract Only
V. P. Bovkun and A. V. Men *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1357-1370 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-14998# Joint Publications Research Service, Arlington, Va.
METRIC-WAVE AND DECIMETRIC-WAVE APERTURE SYNTHESIS SYSTEMS (REVIEW) Abstract Only
Yu. P. Ilyasov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1394-1402 (For primary document see N85-14991 06-31)
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N85-14999# Joint Publications Research Service, Arlington, Va.
CROSS-SHAPED APERTURE SYNTHESIS SYSTEM Abstract Only
G. Ya. Smolkov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 5-6 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1403-1419 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15000# Joint Publications Research Service, Arlington, Va.
DECIMETRIC-WAVE APERTURE SYNTHESIS SYSTEM AT SCIENTIFIC RESEARCH INSTITUTE OF RADIOPHYSICS Abstract Only
V. S. Beagon, N. A. Dugin, A. A. Romanychev, L. R. Semenova, V. I. Turchin, and N. M. Tseytlin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 6-7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1420-1427 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15009# Joint Publications Research Service, Arlington, Va.
INVARIANCE OF MEAN-SQUARE EFFECTIVE AREA OF SYNTHESIZED APERTURES Abstract Only
B. A. Dubinskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 13 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1493-1496 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15010# Joint Publications Research Service, Arlington, Va.
ENERGY CORRELATION BETWEEN NATURAL EXTRA-LOW-FREQUENCY NOISES AT VARIOUS FREQUENCIES Abstract Only
A. P. Nikolayenko *In its* USSR Rept.: Electron. and Elec. Eng.

(JPRS-UEE-84-012) 26 Sep. 1984 p 13-14 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 3-11 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15013# Joint Publications Research Service, Arlington, Va.
SCATTERING OF ELECTROMAGNETIC WAVES BY SURFACE WITH SMALL ASPERITIES Abstract Only
Zh. D. Genchev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 15 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 48-55 Original language doc. previously announced in IAA as A84-27081 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15014# Joint Publications Research Service, Arlington, Va.
APPROACH TO SOLUTION OF DIFFRACTION PROBLEM FOR WAVES AT ROUGH SURFACE Abstract Only
A. N. Teokharov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 15-16 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 65-70 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15015# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF ZEROS IN RADIATION PATTERN OF LINEAR ANTENNA ARRAY Abstract Only
Ya. V. Vasilkiv, A. M. Kovalchuk, and P. A. Savenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 16 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 96-103 Original language doc. previously announced in IAA as A84-27085 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15018# Joint Publications Research Service, Arlington, Va.
SELECTION OF PARAMETERS FOR IMAGE DECOMPOSITION BY TELEVISION SYSTEM FOR RECOGNITION OF GROUP OF POINT SOURCES
D. P. Rakcheyev and A. S. Tolstikov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 18-22 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Proborostr. (Leningrad), v. 27, no. 4, Feb. 1984 p 3-7 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15019# Joint Publications Research Service, Arlington, Va.
TRANSIENT CURRENTS OF IDEALLY CONDUCTING BODY OF REVOLUTION WITH TRANSIENT DIFFRACTION Abstract Only
Ye. N. Vasilyev and I. G. Yefimova *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 23 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 87-95 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15022# Joint Publications Research Service, Arlington, Va.
AHARONOV-BOHM EFFECT IN ABSORPTION OF ELECTROMAGNETIC WAVE Abstract Only
R. Bakanas *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 32 Transl. into ENGLISH from Litovskiy Fiz. Sb. (Vilnius, USSR), v. 23, no. 6, Jun. 1983 p 52-56 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15030# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF ELECTROMAGNETIC FIELD COMPONENTS FROM ARBITRARILY ORIENTED GYRO PLATFORMS Abstract Only
M. B. Sultanov and V. A. Shcherbakov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 39 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 40-41 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15034# Joint Publications Research Service, Arlington, Va.
EFFECT OF EXTERNAL MAGNETIC FIELD ON CHARACTERISTICS OF CURRENT-CARRYING STEEL TAPE Abstract Only
V. N. Ostreyko and Yu. L. Chernikov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 43 Transl. into ENGLISH from Elektrichestvo (Moscow), no. 2, Feb. 1984 p 42-47 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15036# Joint Publications Research Service, Arlington, Va.
SCATTERING OF H10-MODE WAVE BY NARROW CONDUCTING PLATE INSIDE RECTANGULAR WAVEGUIDE Abstract Only
I. M. Yakover *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 45 Transl. into ENGLISH from Litovskiy Fiz. Sb. (Vilnius, USSR), v. 23, no. 6, Jun. 1983 p 63-69 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15043# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF MOVING-TARGET SELECTION RADAR DEVICES FOR NONGAUSSIAN SIGNALS FOR STATIONARY TARGETS Abstract Only
V. G. Valeyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 2 Transl. into ENGLISH from Radiotekh. Electrotek. (Moscow), v. 29, no. 4, Apr. 1984 p 691-697 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15044# Joint Publications Research Service, Arlington, Va.
RESOLUTION AND ACCURACY OF RADAR MEASUREMENTS Abstract Only
V. I. Serebrennikov and G. Ya. Shtekman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 2 Transl. into ENGLISH from Radiotekh. Elektrotek. (Moscow), v. 29, no. 4, Apr. 1984 p 705-715 Original language document announced as A84-32136 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15045# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF SYSTEMS FOR COHERENT WEIGHTED SIGNAL PROCESSING AGAINST BACKGROUND OF CORRELATED INTERFERENCE Abstract Only
D. I. Popov and V. I. Koshelev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 3 Transl. into ENGLISH from Radiotekh. Electron. (Moscow), v. 29, no. 4, Apr. 1984 p 789-792 Original language document announced as A84-32144 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15046# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF EXTERNAL ANTENNA CHARACTERISTICS WITH ALLOWANCE FOR DISTORTING FACTORS (REVIEW) Abstract Only
D. I. Voskresenskiy, Ye. N. Voronin, V. M. Komarov, and Ye. Ye. Nechayev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 4-19 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15047# Joint Publications Research Service, Arlington, Va.
REMOTE SOUNDING OF FIELDS IN FEED RADIATORS OF MULTI-ELEMENT ANTENNA SYSTEM WITH ALLOWANCE FOR INTERACTION WITH SOUNDING DEVICE Abstract Only
I. V. Guzeyev and V. V. Demidov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 4-5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron.

(Kiev), V. 27, no. 2, Feb. 1984 p 20-26 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15048# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF FLAT FINITE ANTENNA CONSISTING OF WAVEGUIDE RADIATORS Abstract Only
A. D. Khzmalyan *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 45-49 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15049# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF CIRCULAR-POLARIZED PRINTED RADIATORS IN PLANAR PHASED ANTENNA ARRAY Abstract Only
V. S. Filippov and B. V. Shatokhin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 5-6 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 53-57 Original language document announced as A84-25157 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15050# Joint Publications Research Service, Arlington, Va.
GREEN FUNCTION IN THEORY OF MICROSTRIP ANTENNAS Abstract Only
B. A. Panchenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 65-68 Original language document announced as A84-25188 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15051# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CHARACTERISTICS OF PHASED ANTENNA ARRAY CONSIDERING INTERACTION BETWEEN RADIATORS AND PROPERTIES OF POWER DIVIDER Abstract Only
B. S. Filippov and S. A. Pavlov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 6-7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev) v. 27, no. 2, Feb. 1984 p 71-74 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15052# Joint Publications Research Service, Arlington, Va.
FAST METHOD FOR CALCULATING RADIATION PATTERNS OF NONEQUIDISTANT RADIATOR SYSTEMS Abstract Only
A. N. Danilenko and M. O. Kishchenkov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 79-80 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15053# Joint Publications Research Service, Arlington, Va.
SCATTERING MATRIX OF ANTENNA ARRAY WITH JOULE LOSSES IN RADIATORS Abstract Only
P. L. Tokarskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 81-83 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15054# Joint Publications Research Service, Arlington, Va.
SYSTEM OF EQUATIONS FOR FINDING ANTENNA RADIATION PATTERN FROM NEAR-FIELD SAMPLES Abstract Only
S. L. Solovtsov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 83-84 Original language document announced as A84-25164 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15055# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF TWO-FREQUENCY COMBINED DIPOLE ANTENNA ARRAYS Abstract Only
A. S. Ilinskiy, L. I. Ponomarev, I. V. Berezhnaya, and A. V. Dolgiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 85-86 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15056# Joint Publications Research Service, Arlington, Va.
MICROSTRIP ANTENNA FOR MULTICHANNEL RADIOMETER Abstract Only
S. T. Knyazev, Ye. I. Nefedov, and B. A. Panchenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 9 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 2, Feb. 1984 p 86-87 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15057# Joint Publications Research Service, Arlington, Va.
ALGORITHM FOR TRACKING MANUEVERING OBJECT WITH AMBIGUOUS MEASUREMENTS Abstract Only
In its USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 9 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 3-8 Original language document announced as A84-28061 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15059# Joint Publications Research Service, Arlington, Va.
PECULIARITIES OF MICROPROCESSOR IMPLEMENTATION OF ALGORITHMS FOR PROCESSING RADIO SIGNALS AND NOISE IN LARGE ANTENNA ARRAYS Abstract Only
V. V. Popovskiy and Ye. I. Glushankov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 51-53 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15060# Joint Publications Research Service, Arlington, Va.
EFFICIENCY IN INTEGRAL ACTIVE ANTENNAS Abstract Only
M. I. Kontorovich and N. M. Lyapunova *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 10-11 Transl. into ENGLISH from Radiotekh. (Moscow), no. 4, Apr. 1984 p 86-88 Original language document announced as A84-35769 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15061# Joint Publications Research Service, Arlington, Va.
DISTORTIONS OF RADIO PULSE DURING REFLECTION FROM MAXIMUM REGION OF IONOSPHERIC LAYER Abstract Only
S. A. Namazov, Yu. I. Orlov, and N. N. Fedorov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 11 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 609-619 Original language document announced as A84-32126 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15062# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF POLARIZATION GRIDS MADE OF PARALLEL METAL STRIPS DURING HEMISPHERICAL SCANNING Abstract Only
L. A. Rud *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 11-12 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v, 29, no. 4, Apr. 1984 p 637-642 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15063# Joint Publications Research Service, Arlington, Va.
DISTRIBUTION OF ATMOSPHERIC RADIO INTERFERENCE Abstract Only
D. S. Dobryak *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 12 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 666-672 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15064# Joint Publications Research Service, Arlington, Va.
ASYMPTOTICALLY OPTIMAL RANKING ALGORITHMS FOR QUASI-DETERMINATE SIGNAL DETECTION Abstract Only
A. M. Brikker *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 12-13 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 681-690 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15065# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF SPIN ECHO SIGNALS IN MULTI-PULSE EXPERIMENT Abstract Only
V. I. Dudkin, V. Yu. Petrunkin, and V. I. Tarkhanov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 13 Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 732-740 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15066# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL DETERMINATION OF PROPAGATION RATE OF ELF SIGNALS EMPLOYED BY OMEGA RADIO NAVIGATION SYSTEM FOR PHASE MEASUREMENTS Abstract Only
S. I. Kotyashkin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 14 refs Transl. into ENGLISH from Radiotekh. Elektron. (Moscow), v. 29, no. 4, Apr. 1984 p 795-797 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15067# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF DEVELOPMENT OF SPACE COMMUNICATION Abstract Only
N. T. Petrovich and O. N. Popokhov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 33 Transl. into ENGLISH from Elektrosvyaz (Moscow), no. 3, Mar. 1984 p 25, 44 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15203# Joint Publications Research Service, Arlington, Va.
SHIPBOARD AND SATELLITE-AIDED COMMUNICATIONS EQUIPMENT IN EXHIBITION Abstract Only
V. Ryndin *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 42 Transl. into ENGLISH from Sov. Latv. (Riga), 19 Jul 1984 p 4 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15220# Joint Publications Research Service, Arlington, Va.
INVESTIGATING PHASE STRUCTURE OF ELECTROMAGNETIC FIELD IN LOCAL INHOMOGENEITIES BY MODELING METHOD Abstract Only
A. N. Bukin, A. E. Isayev, and B. G. Denison *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 127-128 Transl. into ENGLISH from Vestn. Leningr. Univ.: Fiz., Khim (Leningrad), no. 4, issue 1, Feb. 1984 p 95-99 (For primary document see N85-15196 06-42)
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N85-15244# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF RADAR TO MEASURE SEA ICE MERITS PRIZE NOMINATION Abstract Only
Yu. Kobzarev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 147 Transl. into ENGLISH from Izv. (Moscow), 1 Sep. 1984 p 3 (For primary document see N85-15196 06-42)
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33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N85-15110*# Underwriters Labs., Inc., Tampa, Fla. Flat-Plate Solar Array Project.
SAFETY REQUIREMENTS FOR WIRING SYSTEMS AND CONNECTORS FOR PHOTOVOLTAIC SYSTEMS Final Report
Thomas Lundweit Sep. 1984 87 p
(Contract NAS7-100)
(NASA-CR-174211; DOE/JPL-955392-3; NAS 1.26:174211; DE85-001360) Avail: NTIS HC A05/MF A01 CSCL 09C

Safety requirements for wiring systems and connections and for separable connectors for use in roof mounted photovoltaic (PV) arrays were identified. The environmental use conditions applicable to PV arrays and the differences between integral, direct, standoff and rack mounted modules were considered. The articles in the national electrical code (NEC) covering wiring systems are discussed to: (1) define the wiring systems; (2) identify the permitted uses and use restrictions; (3) outline the advantages and disadvantages; and (4) address the concerns regarding support, protection against mechanical damage and wet versus dry locations. The advantages and disadvantages of each wiring system to arrive at candidate wiring systems that are best suited for use in PV arrays are assessed. For candidate wiring systems which use restrictions that may prohibit their use, considerations need to be addressed by any proposed revision to the NEC to permit acceptance by the inspection authorities. The various wiring termination methods that are permitted by the NEC are discussed and those which have features that are desirable for PV applications are identified. DOE

N85-15111# Lehigh Univ., Bethlehem, Pa. Center for Solid State Studies.
ELECTRICAL PROPERTIES OF 10-50 nm TEOS (TETRAETHOXYSILANE) LPCVD (LOW PRESSURE CHEMICAL VAPOR DEPOSITION) FILMS Technical Progress Report, 26 Oct. 1980 - 25 Apr. 1984
R. H. Vogel, S. R. Butler, and F. J. Feigl 24 Aug. 1984 34 p
(Contract DAAG29-81-K-0007)
(AD-A146416; ARO-17439.3-MS) Avail: NTIS HC A03/MF A01 CSCL 20/3

The objective of this research was to develop low-temperature processing sequences which improved the quality of deposited oxides in the 10-50 nm thickness range appropriate to very-large-scale-integration (VLSI) technology. Low fabrication temperature is a requirement which VLSI scaling imposes on insulator technology. In the present study, all oxide processing was carried out at temperatures below that required for dry thermal oxidation of silicon. GRA

N85-15112# Washington Univ., Seattle. Dept. of Computer Science.
VLSI DESIGN TOOLS, REFERENCE MANUAL, RELEASE 2.0 Interim Report
Aug. 1984 299 p
(Contract MDA903-82-C-0424)
(AD-A146444; TR-84-08-07) Avail: NTIS HC A13/MF A01 CSCL 09/5

This report describes the use of the University of Washington/Northwest VLSI Consortium's package of VLSI design tools. The tools described are: Functional Design Tools; Layout Tools; Display Tools; Rule Checkers; Circuit Extractor; Simulation Tools; and Utilities/Miscellaneous. GRA

N85-15113# Lehigh Univ., Bethlehem, Pa. Center for Solid State Studies.
OXIDE CHARGE CHARACTERISTICS OF LOW TEMPERATURE

MOS (METAL-OXIDE-SILICON) OXIDE FILMS Final Report, 26 Oct. 1980 - 25 Apr. 1984
S. R. Butler and F. J. Feigl 24 Aug. 1984 14 p
(Contract DAAG29-81-K-0007)
(AD-A146447; ARO-17439.4-MS) Avail: NTIS HC A02/MF A01 CSCL 09/1

The effects of annealing sequence were studied on three types of silicon dioxide films fabricated at approximately 700 deg C. The oxide and interface charge characteristics of capacitors incorporating these oxides were measured. Results were compared with data from capacitors fabricated on a standard oxide film, produced by dry thermal oxidation at 1000 deg C. GRA

N85-15114# Woods Hole Oceanographic Institution, Mass.
A MINIATURE URETHANE MOLDED ACOUSTIC TRANSDUCER
C. V. R. Dunn Aug. 1984 47 p
(Contracts N00014-82-C-0019; N00014-79-C-0071; Grant NSF OCR-80-14938)
(AD-A146459; WHOI-84/30) Avail: NTIS HC A03/MF A01 CSCL 17/1

The development of a reliable miniature molded transducer for the Williams/Koehler acoustic current meters, BASS (Benthic Acoustic Stress Sensor) is documented. The procedures developed and components selected for manufacturing the transducer assemblies are documented as well as some of those rejected. Engineering tests performed to ensure reliable performance in the field are outlined and discussed as well. The transducers are now routinely molded with great success (over 1200 operational transducer months to date) and commercial sources are being investigated. Author (GRA)

N85-15115# Harry Diamond Labs., Adelphi, Md.
AN INDIRECT MEASURE OF BELOW-GROUND ELECTRIC FIELD, CONDUCTIVITY, AND DIELECTRIC CONSTANT
R. P. Manriquez and J. F. Sweton Sep. 1984 36 p
(Contract MIPR-HC1001-3-401)
(AD-A146518; HDL-TR-2052) Avail: NTIS HC A03/MF A01 CSCL 20/3

This paper uses experimental data obtained on a buried, conducting, parallel-plate sensor to evaluate the electric field beneath the air/ground interface. The sensor is described with a simple equivalent circuit, and the characteristic response is evaluated both in time and frequency. The agreement between the calculated and measured transmitted electric field is quite good for reasonable values of constant and frequency-dependent electrical conductivity and dielectric permittivity of the ground. The electrical properties of the ground were the only parameters that needed to be adjusted to provide agreement between theory and experiment. Those values taken were considered within reasonable bounds. GRA

N85-15116# Pennsylvania Univ., Philadelphia. Dept. of Electrical Engineering and Science.
AN INVESTIGATION OF THE ELECTRICAL CONDUCTIVITY IN HIGHLY ORIENTED GRAPHITE INTERCALATION COMPOUNDS Final Report
F. L. Vogel Feb. 1984 116 p
(Contract DAAG53-76-C-0061; DA Proj. 1L1-61102-AH-51)
(AD-A146539) Avail: NTIS HC A06/MF A01 CSCL 11/2

It was the possibility of making a lightweight, practical conductor of electricity that led to the research reported here. SbF5, which acts as an acceptor in graphite intercalation compounds has been observed to yield compounds having a axis conductivity comparable to that of copper. The following is a report of an extensive investigation of the various aspects of SbF5 intercalated graphite of interest to its use as a practical conductor. GRA

N85-15117# Texas Univ., Austin. Microwave Lab.
MILLIMETER-WAVE TRAVELLING-WAVE IMPATT DIODE
Y. Fukuoka and T. Itoh 31 May 1984 69 p
(Contract DAAG29-81-K-0053)
(AD-A146545; NW-84-7; ARO-17735.35-EL) Avail: NTIS HC A04/MF A01 CSCL 09/1

A millimeter-wave travelling-wave IMPATT diode is studied. This device is a simple configuration and is suitable for monolithic integration. The travelling-wave structure permits oscillation of the IMPATT diode at a desired frequency without any external resonant circuit, making the whole system extremely simple. The theoretical analysis determines the condition under which gain is produced in the IMPATT device. A reasonable agreement is obtained with the experimental results. GRA

N85-15118# Texas Univ., Austin. Dept. of Electrical and Computer Engineering.
INTERFACE STRUCTURES FOR MILLIMETER-WAVE CIRCUITS Final Report, 1 Mar. 1981 - 31 Aug. 1984
T. Itoh 25 Sep. 1984 76 p
(Contract DAAG29-81-K-0053)
(AD-A146557; ARO-17735.36-EL) Avail: NTIS HC A05/MF A01 CSCL 09/5

This report summarizes research activities at the Microwave Laboratory, University of Texas on various structures for millimeter-wave circuits under sponsorship of the U.S. Army Research Office Contract DAAG29-81-K-0053. The topics of investigation include quasi-optical mixers, E-plane filters, printed transmission lines, distributed gain mechanisms, slow-wave phenomena and dielectric waveguides. A list of publications is included. Author (GRA)

N85-15119# Naval Surface Weapons Center, White Oak, Md.
LITHIUM BATTERY SAFETY: A FIBER-OPTIC APPLICATION FOR SAFE OBSERVATION OF LITHIUM CELLS UNDER SEVERE TESTS
M. Stimler 10 Jan. 1984 20 p
(AD-A146646; NSWC/TR-84-124) Avail: NTIS HC A02/MF A01 CSCL 10/2

This report documents an experimental concept related to lithium battery safety. The concept should allow remote visual display of components inside lithium cells while under test conditions. The purpose of the proposed experiment is to provide a safer means for observing the internal components cells under various test conditions including destructive testing. Author (GRA)

N85-15120# Department of the Navy, Washington, D. C.
DIGITAL RASTER TIMING ENCODER-DECODER Patent Application
E. W. Gennetten and D. A. Gomez, inventors (to Navy) Filed 6 Jun. 1984 28 p
(AD-D011279; US-Patent-Appl-SN-617220) Avail: NTIS HC A03/MF A01 CSCL 09/3

The invention presents a digital raster timing encoder/decoder system wherein television raster synchronization pulses and other timing pulses and information data are generated. The invention comprises a digital clock source having coding means which combined with the clock source encodes preselected digital signals containing information on raster synchronization control and timing, and also any other information data that is desired. The encoded signal output is transmitted either directly or via some special transmission link, for example by use of a Manchester Decoder clock multiplier system, to a receiving and decoding means. The received signal is decoded to create timing signals for operation control of the video television scanning system, and to read out other desired digital data that has been also transmitted within the signal. The system takes advantage of the fact that control signals of conventional synchronization pulses contain large deadband areas within which additional data information may be placed. Such additional digital information may be used to add other control pulse capability, or to add information transmission capability. A principle feature of the system is that only a single channel is needed to transmit synchronization pulses and any additional timing pulses or information of interest. Author (GRA)

N85-15121# Department of the Army, Washington, D. C.
FUSE STATUS INDICATOR SYSTEM Patent Application
H. Middlebrooks, inventor (to Army) Filed 4 Sep. 1984 16 p
(AD-D011294; US-Patent-Appl-SN-646535) Avail: NTIS

HC A02/MF A01 CSCL 14/2

An on-line indicator connected to each fuse of an electrical circuit includes an LED which becomes illuminated if its protected fuse blows. Groups of these on-line indicators can be connected via on OR gate to a single master fuse status indicator which also includes an LED which becomes illuminated if any of the on-line indicators connected thereto has its LED illuminated. The circuitry can accommodate power supplies of different voltages of either polarity. Opto-isolators can be used to reduce stand-by current drain and to isolate the on-line indicators from each other.

Author (GRA)

N85-15122# Los Alamos Scientific Lab., N. Mex.

REPETITIVE PULSE GENERATION WITH INDUCTIVE ENERGY STORAGE: A NEW TECHNOLOGY FOR DEFENSE

E. M. Honig Apr. 1984 6 p refs

(Contract W-7405-eng-36)

(DE84-017090; LA-10004) Avail: NTIS HC A02/MF A01

Many of the weapons concepts proposed for future defense weapons will require bursts of energy at high power and at high repetition rates. The feasibility of using energy storage to power such systems was demonstrated. An inductive store and a new energy transfer circuit were used to produce a 75-MW, 5-kHz pulse train at a 1-(UC OMEGA) load. With a new high power opening switch, such transfer circuits have the potential to operate at the 10-GW level. The major results of this program are: an understanding of the inductive energy storage and opening switch problem, a demonstration of this technology at a very high pulse repetition rate, and the development of new transfer circuits featuring high efficiency and simplicity. DOE

N85-15123# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

THE dc SQUID AS A TUNED RADIOFREQUENCY AMPLIFIER

C. Hilbert and J. Clarke Sep. 1984 6 p refs Presented at the Appl. Superconductivity Conf., San Diego, Calif., 10-13 Sep. 1984 Submitted for publication

(Contract DE-AC03-76SF-00098)

(DE85-000701; LBL-18362; CONF-840937-8) Avail: NTIS HC A02/MF A01

The design criteria for a tuned radiofrequency amplifier based on a dc SQUID are briefly discussed. A practical amplifier involving a planar dc SQUID with a 4-1/4-turn spiral input coil and operated at 4.2 K had a gain of 18.6 + or - 0.5 db and a noise temperature of 1.7 + or - 0.5 K at 93 MHz. These results are in satisfactory agreement with predicted values. DOE

N85-15124*# United Technologies Corp., South Windsor, Conn. Power Systems Div.

PHOSPHORIC AND ELECTRIC UTILITY FUEL CELL TECHNOLOGY DEVELOPMENT Technical Progress Report

R. D. Breault, T. A. Briggs, J. V. Congdon, T. E. DeMarche, R. L. Gelting, G. J. Goller, W. I. Luoma, M. W. McCloskey, A. P. Mientek, and J. J. OBrien Jan. 1984 29 p

(Contract DE-AC21-83FE-60338)

(NASA-CR-174215; NAS 1.26:174215; DE84-015307; ; DOE/FE-60338/9 TPR-9) Avail: NTIS HC A03/MF A01 CSCL 09A

The advancement of electric utility cell stack technology and reduction of cell stack cost was initiated. The cell stack has a nominal 10 ft (2) active area and operates at 120 psia/405(0)F. The program comprises six parallel phases, which culminate in a full height, 10-ft(2) stack verification test: (1) provides the information and services needed to manage the effort, including definition of the prototype commercial power plant; (2) develops the technical base for long term improvements to the cell stack; (3) develops materials and processing techniques for cell stack components incorporating the best available technology; (4) provides the design of hardware and conceptual processing layouts, and updates the power plant definition of Phase 1 to reflect the results of Phases 2 and 3; Phase 5 manufactures the hardware to verify the achievements of Phases 2 and 3, and analyzes the cost of this hardware; and Phase 6 tests the cell stacks assembled from the hardware of Phase 5 to assess the state of development. DOE

N85-15125# Argonne National Lab., Ill. Chemical Technology Div.

PERFORMANCE ON ADVANCED LEAD-ACID BATTERIES FOR LOAD-LEVELING APPLICATIONS

J. F. Miller, E. C. Gay, F. Hornstra, and N. P. Yao 1984 8 p refs Presented at the Fall Meeting of the Electrochemical Society, New Orleans, 7 Oct. 1984

(Contract W-31-109-eng-38)

(DE84-015817; CONF-841058-5) Avail: NTIS HC A02/MF A01

Advanced lead-acid batteries developed for load leveling applications were evaluated. The batteries (36-kWh and 18-kWh modules) have a projected life of greater than 4000 deep discharge cycles. The results of performance and life tests are presented. Battery capacities and efficiencies are shown as a function of discharge rate. The status of ongoing accelerated life cycle tests conducted at 50(0)C and 60(0)C are presented. DOE

N85-15126# Argonne National Lab., Ill. Chemical Technology Div.

IMPACT OF TEMPERATURE ON CYCLE LIFE OF GLOBE ISOA EV-3000 LEAD-ACID BATTERIES

E. C. Gay, D. R. Fredrickson, C. C. Christianson, F. Hornstra, and N. P. Yao 1984 6 p refs Presented at the Fall Meeting of the Electrochemical Society, New Orleans, 7 Oct. 1984

(Contract W-31-109-eng-38)

(DE84-015840; CONF-841058-6) Avail: NTIS HC A02/MF A01

The results of testing to assess the impact of temperature on cycle life of Globe improved state-of-the-art (ISOA) EV-3000 lead-acid batteries are presented. The tests were conducted over the temperature range of 15 to 52 C for a fixed Ah discharge that was independent of temperature (as would be the case of an electric vehicle with a fixed mission that did not vary with temperature). The results indicate that low-temperature (15 C) and high-temperature (52 C) cycle life of an ISOA lead-acid battery is significantly reduced when operated at a capacity equivalent to 80% of its available room temperature capacity. The temperature for the highest cycle life appears to be in the range of 30 C to 44 C. DOE

N85-15127# Argonne National Lab., Ill.

STRUCTURAL STUDIES ON LEAD DIOXIDES

Ravi Varma, Jurgen Eckert (Los Alamos National Lab.), V. A. Maroni, J. A. Goldstone (Los Alamos National Lab.), C. Giardano, T. Cehelnik, R. Kumar, S. Siegel, and B. Tani 1984 15 p refs Presented at the Fall Meeting of the Electrochemical Society, New Orleans, 7 Oct. 1984

(Contract W-31-109-eng-38)

(DE84-015837; CONF-841058-7) Avail: NTIS HC A02/MF A01

Recent neutron-scattering studies on battery-plate lead dioxides indicate that these materials contain hydrogen and are nonstoichiometric. Such defects are also currently being investigated by other powerful techniques such as X-ray diffraction, X-ray photoelectron spectroscopy, and diffuse reflectance spectroscopy. An attempt on correlation is made to establish between the crystal and the electrochemical properties of lead dioxides. Significant findings of research done during the past few years relating to the defect structure of lead dioxides are discussed. DOE

N85-15128# Communications Satellite Corp., Clarksburg, Md.

DESIGN AND DEVELOPMENT OF A SEALED 100-Ah NICKEL-HYDROGEN BATTERY

J. Dunlop, H. Vaidyanathan, J. Sindorf, and M. Earl Aug. 1984 88 p refs Sponsored in part by Sandia National Labs.

(Contract DE-AC04-76DP-00789)

(DE84-016935; SAND-84-7155) Avail: NTIS HC A05/MF A01

A 100-Ah prismatic cell that can be manufactured by using established commercial manufacturing procedures was developed for terrestrial applications. Application of these processes to the development of a commercial hydrogen nickel oxide (H2-NiO) battery significantly reduces costs, and allows a realistic assess-

ment of manufacturing costs for large scale production. The technology which is developed represents a significant departure from the original aerospace design. The next step is to fabricate multicell batteries that will serve as building blocks for the evolution of this technology into larger multikilowatt energy storage systems. DOE

N85-15129# Michigan State Univ., East Lansing.
A MODIFIED UNIT COMMITMENT AND GENERATION CONTROL FOR UTILITIES WITH LARGE WIND GENERATION PENETRATIONS
R. A. Schlueter, G. L. Park, T. W. Reddoch (ORNL), and J. S. Lawler (Tennessee Univ., Knoxville) 1984 8 p refs Presented at the Power Engineering Society Summer Meeting, Seattle, 15 Jul. 1984
(Contract DE-AC05-84OR-21400)
(DE84-015362; CONF-840706-4) Avail: NTIS HC A02/MF A01

A modified unit commitment that would be updated on three different cycles daily, quarter hourly and every minute is proposed. The 24 hour updated unit commitment includes the effects of load and slow trend wind power change that predicts 24 hours ahead. The quarter hourly updated unit commitment handles the fast trend and cyclic change in wind power that predicts 1 hour ahead and commits peaking, regulation, and quick pickup and possibly economic units to handle these wind power changes. The minute updated unit commitment connects or disconnects quick pickup units or wind turbines based on a 15 minute ahead prediction of cyclic wind power variations with periods greater than 10 minutes. The modified generation control utilizes: (1) normal automatic generation control; (2) coordinated blade pitch control of all wind turbines in the array to clip and smooth wind power variations; (3) supplementary control of peaking, regulating and quick pickup units committed by the quarter hourly and minute updated unit commitments. The unit commitment problem to supply sufficient generation to meet load and the spinning reserve, operating reserve, unloadable generation reserve, and load following levels required to assure operating reliability, the generation control problem of controlling both conventional and wind generation to track load are discussed. The inadequacy of the three present alternative solutions to the unit commitment and generation control problem are outlined. DOE

N85-15002# Joint Publications Research Service, Arlington, Va.
PHASE PROBLEM IN APERTURE SYNTHESIS SYSTEMS Abstract Only
M. V. Konyukov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1437-1447 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15008# Joint Publications Research Service, Arlington, Va.
PRIMARY DATA PROCESSING IN VERY LONG BASELINE RADIOINTERFEROMETER Abstract Only
P. A. Fridman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 12 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1487-1493 Original language doc. previously announced in IAA as A84-20819 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15017# Joint Publications Research Service, Arlington, Va.
ANTENNA MATCHING DEVICE TUNING FOR TYPE ZhRU RADIOSTATIONS Abstract Only
M. I. Iof *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 17 Transl. into ENGLISH from Avtomatika, Telemekhan. (Moscow), no. 2, Feb. 1984 p 39-40 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15021# Joint Publications Research Service, Arlington, Va.
CHOICE OF CRITERIA FOR REJECTION OF INSULATING COMPONENTS IN HIGH-VOLTAGE SURGE EQUIPMENT Abstract Only
V. Ya. Ushakov, V. F. Vazhov, and A. Ya. Umnov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 31 Transl. into ENGLISH from Elektrichestvo (Moscow), no. 2, Feb. 1984 p 66-70 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15024# Joint Publications Research Service, Arlington, Va.
LOW FREQUENCY NOISE IN OSCILLATOR WITH LIMITED SPACE-CHARGE ACCUMULATION Abstract Only
V. V. Zaytsev, V. B. Orlov, and A. V. Yakimov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 33 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 79-86 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15025# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF ENERGY CONVERSION DURING LOCKING OF ELECTRON BUNCHES BY ELECTROMAGNETIC WAVE IN LONGITUDINAL ELECTROSTATIC FIELD Abstract Only
Ye. D. Belyavskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 34 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 123-126 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15035# Joint Publications Research Service, Arlington, Va.
MAGNETIC FIELD CALCULATION FOR IDEAL CONDUCTORS BY METHOD OF EQUIVALENT CURRENTS Abstract Only
V. M. Mikhaylov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 44 Transl. into ENGLISH from Elektrichestvo (Moscow), no. 2, Feb. 1984 p 49-52 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15041# Joint Publications Research Service, Arlington, Va.
PERCEPTIBILITY OF NONLINEAR DISTORTIONS IN POWER AMPLIFIER Abstract Only
Valentin Leksin and Viktor Leksin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 59 Transl. into ENGLISH from Radio (Moscow), no. 2, Feb. 1984 p 33-35 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15068# Joint Publications Research Service, Arlington, Va.
COMPUTER INVESTIGATION OF EFFECTS OF HIGH INJECTION IN TRANSISTOR LARGE INTEGRATED CIRCUIT STRUCTURES Abstract Only
A. N. Bubennikov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-011) 25 Sep. 1984 p 51 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 76-79 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15069# Joint Publications Research Service, Arlington, Va.
NUMERICAL ESTIMATION OF CHARGE TRANSFER TIME IN CHARGE-COUPLED DEVICE EMPLOYING LATENT GALLIUM ARSENIDE CHANNEL Abstract Only
A. I. Prokopyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 51-52 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mat. 1984 p 79-80 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15070# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED POWER THYRISTORS WITH EXCELLENT SWITCHING AND LOAD CHARACTERISTICS Abstract Only
V. L. Kuzmin, V. M. Kukhamkin, and O. K. Toomla *In its* USSR

Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-011) 25 Sep. 1984 p 52 Transl. into ENGLISH from Electrotekh. (Moscow), no. 3, Mar. 1984 p 2-5 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15071# Joint Publications Research Service, Arlington, Va.
HIGH-POWER GATE TURN-OFF THYRISTORS Abstract Only
R. E. Ayazyan *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 52-53 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 5-11 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15072# Joint Publications Research Service, Arlington, Va.
TRENDS IN DEVELOPMENT OF BIPOLAR POWER TRANSISTORS Abstract Only
V. A. Potapchuk *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 53-54 Transl. into ENGLISH from Elektrotekh. (Moscow) no. 3, Mar. 1984 p 11-14 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15073# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED POWER DEVICES WITH FIELD CONTROL Astract Only
O. F. Goryunova and V. A. Kuzmin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 54-55 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 15-19 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15074# Joint Publications Research Service, Arlington, Va.
SEMICONDUCTOR HIGH-VOLTAGE POWER DEVICES: STATE OF ART AND OUTLOOK Abstract Only
K. D. Boronin, Yu. A. Yevseyev, Yu. M. Loktayev, N. A. Sobolov, V. M. Tuchkevich, and V. Ye. Chelnokov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 55-56 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 19-21 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15075# Joint Publications Research Service, Arlington, Va.
NEW METHODS OF FAST SWITCHING OF HIGH POWER BY MEANS OF SEMICONDUCTOR DEVICES Abstract Only
I. V. Grekhov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 56-57 Transl. into ENGLISH from Elektrotekh., no. 3, Mar. 1984 p 21-25 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15076# Joint Publications Research Service, Arlington, Va.
GALIUM-ARSENIDE POWER DEVICES Abstract Only
Zh. I. Alferov, V. M. Tuchkevich, and V. Ye. Chelnokov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 57 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 25-28 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15077# Joint Publications Research Service, Arlington, Va.
INTEGRATED POWER DEVICES WITH THREE-DIMENSIONAL CONNECTION FOR AUTOMATION SYSTEMS Abstract Only
I. A. Liniychuk, A. A. Strashnov, and V. S. Zelisko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 58 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 28-30 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15079# Joint Publications Research Service, Arlington, Va.
CURRENT-VOLTAGE CHARACTERISTICS OF SEMICONDUCTOR POWER DEVICES OPERATING AT HIGH CURRENT DENSITIES Abstract Only
V. A. Kuzmin and T. T. Mnatsakanov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 62 Transl. into ENGLISH from Elektrotek. (Moscow), no. 3, Mar. 1984 p 39-44 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15080# Joint Publications Research Service, Arlington, Va.
ALLOWABLE SURGE CURRENTS AND FAILURE MECHANISMS IN SEMICONDUCTOR POWER DEVICES IN VARIOUS MODES OF OPERATION Abstract Only
V. A. Kuzmin, V. I. Mamonov, and Yu. A. Chesnokov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 63 Transl. into ENGLISH from Elektrotek. (Moscow), no. 3, Mar. 1984 p 43-47 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15081# Joint Publications Research Service, Arlington, Va.
SEMICONDUCTOR SUBMICROSECOND POWER COMMUTATOR SWITCHES Abstract Only
V. I. Brylevskiy and A. F. Kardo-Sysoyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 64 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 51-54 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15082# Joint Publications Research Service, Arlington, Va.
TWO-ROTOR ALTERNATORS WITH SUPERCONDUCTOR FIELD WINDING Abstract Only
Ye. Ya. Kazovskiy and V. Ye. Sigayev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 65 Transl. into ENGLISH from Elektrotekh. (Moscow), no. 3, Mar. 1984 p 60-63 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15085# Joint Publications Research Service, Arlington, Va.
QUALITY CONTROL OF INTEGRATED CIRCUITS BY PARAMETRIC IDENTIFICATION METHODS Abstract Only
F. N. Pokrovskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 111 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 90-93 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N85-15130 British Gas Corp., London (England).
INVESTIGATION OF THE LOCAL MASS TRANSFER OF A LAMINAR AND TURBULENT FALLING LIQUID FILM
K. Meyer 26 Jul. 1984 32 p refs Transl. into ENGLISH from Waerme und Stoffuebertragung (West Germany), no. 12, 1979 p 121-129 Original language document previously announced in IAA as A79-40298
(BLL-T6368/BG/WH792/84) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The local mass transfer was measured as a function of the measuring length, the starting point and the liquid height above the ring slot. The range of the Reynolds number was 3.86-2496. The validity of the Nusselt theory and the range of it is shown. The local hydrodynamics is the most important factor affecting the increase of the local Sherwood number. The accuracy of the measurements is + or - 5%. Author (IAA)

N85-15131 British Gas Corp., London (England).
WORKING MEDIUM FOR SORPTION HEAT PUMPS

Hannelore Zeininger 26 Jul. 1984 21 p Transl. into ENGLISH of Patent Application No. 83100078.1 (1 Jul. 1983) Hoechst A.G., Frankfurt
(BLL-T6360/BG/WH785/84) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

A working medium is described which contains a hydrogen-containing fluoro or fluorochlorohydrocarbon and can be used in heat pumps of the absorption type for the production of cold or heat. The use of the invention in a sorption heat pump with a working medium of FKW 22 and 1-methyl-2-pyrrolidone is discussed. R.S.F.

N85-15132 Rolls-Royce Ltd., London (England).
LAMINAR SEPARATION BUBBLE WITH TRANSITION: PREDICTION TEST WITH LOCAL INTERACTION
C. Gleyzes 8 Nov. 1984 30 p refs Transl. into ENGLISH of French document
(BLL-PNR-90231-(8019.3153)) Avail: British Library Lending Div., Boston Spa, Engl.

The experimental results of a study of a leading edge separation bubble on a peaky airfoil are presented. Boundary layer measurements, mean velocity and longitudinal turbulence intensity were recorded at various values of Reynolds number (100,000 < R sub c < 1,000,000. Results of a study of the transition process in a long bubble are presented. Two calculation methods applicable to short bubbles are proposed. They both use a simple local viscid-inviscid interaction scheme. These results are compared to the experimental ones. R.S.F.

N85-15133*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HEAT TRANSFER RESULTS AND OPERATIONAL CHARACTERISTICS OF THE NASA LEWIS RESEARCH CENTER HOT SECTION CASCADE TEST FACILITY
Herbert J. Gladden, Frederick C. Yeh, and Dennis L. Fronek 1985 20 p refs Presented at the 30th Intern. Gas Turbine Conf. and Exhibit, Houston, Tex., 17-21 Mar. 1985; sponsored by ASME
(NASA-TM-86890; E-2357; NAS 1.15:86890) Avail: NTIS HC A02/MF A01 CSCL 20D

The NASA Lewis Research Center gas turbine hot section test facility has been developed to provide a real-engine environment with well known boundary conditions for the aerothermal performance evaluation/verification of computer design codes. The initial aerothermal research data obtained are presented and the operational characteristics of the facility are discussed. This facility is capable of testing at temperatures and pressures up to 1600 K and 18 atm which corresponds to a vane exit Reynolds number range of 0.5x10(6) to 2.5x10(6) based on vane chord. The component cooling air temperature can be independently modulated between 330 and 700 K providing gas-to-coolant temperature ratios similar to current engine application. Research instrumentation of the test components provide conventional pressure and temperature measurements as well as metal temperatures measured by IR-photography. The primary data acquisition mode is steady state through a 704 channel multiplexer/digitizer. The test facility was configured as an annular cascade of full coverage filmcooled vanes for the initial series of research tests. Author

N85-15134# University Coll. of Swansea (Wales). Inst. for Numerical Methods in Engineering.
A SIMPLE EXTENSION TO MULTIDIMENSIONAL PROBLEMS OF THE ARTIFICIAL VISCOSITY DUE TO LAPIDUS
R. Loehner, K. Morgan, and J. Peraire [1984] 14 p refs
Avail: NTIS HC A02/MF A01

An artificial viscosity suitable for use in the simulation of multidimensional high speed compressible flows by the finite element method is proposed. The form adopted is a consistent extension of the method due to Lapidus. Author

N85-15135*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A COLLECTION OF FLOW VISUALIZATION TECHNIQUES USED IN THE AERODYNAMIC RESEARCH BRANCH
Dec. 1984 35 p Original contains color illustrations
(NASA-TM-85998; A-9840; NAS 1.15:85998) Avail: NTIS HC A03/MF A01 CSCL 20D

Theoretical and experimental research on unsteady aerodynamic flows is discussed. Complex flow fields that involve separations, vortex interactions, and transonic flow effects were investigated. Flow visualization techniques are used to obtain a global picture of the flow phenomena before detailed quantitative studies are undertaken. A wide variety of methods are used to visualize fluid flow and a sampling of these methods is presented. It is emphasized that the visualization technique is a thorough quantitative analysis and subsequent physical understanding of these flow fields. E.A.K.

N85-15136# National Aerospace Lab., Tokyo (Japan).
THE PROPERTIES OF A ROUND TURBULENT BUOYANT JET
Hiroshi Ishigaki and Munekazu Murakami Jul. 1984 9 p refs In JAPANESE; ENGLISH summary
(NAL-TR-826; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

A round turbulent buoyant jet issuing vertically into quiescent fluid is studied theoretically. Formulae on maximum velocity, temperature, concentration and entrainment rate are derived. These formulae agree well with the available experimental data for the whole region of jet and plume. Quantitative classifications of the flow regime of jet, transition and plume are given for the nondimensional distance from the jet exit. Author

N85-15137# Potter (J. Leith), Nashville, Tenn.
REVIEW OF REQUIREMENTS AND STATUS OF SIMULATION AND SCALING OF TRANSONIC, VISCOUS FLOWS Final Report, 24 Aug. 1983 - 19 Mar. 1984
J. L. Potter Sep. 1984 61 p
(AD-A146357; AEDC-TR-84-23) Avail: NTIS HC A04/MF A01 CSCL 20/4

The elements of transonic, viscous-flow simulation are reviewed, documented, and briefly evaluated in the light of newer results from research in this field. Not only the case of wing flows at low angles of attack, but also the problems arising with wings and fuselages or missiles at higher angles are discussed. Criteria to be satisfied in scale-model testing and means for doing that are the principal topics covered. This includes the experimental techniques for simulating shock wave-boundary layer interaction, obtaining full-scale shock location and overall aerodynamic coefficients, and the precautions associated with boundary layer tripping in various types of testing. Vortical flows receive attention, and the requirement for assessing Reynolds number effects is emphasized. The review brings together information from diverse sources that wind tunnel test planners need in further improving experimental results and which is also critical in extrapolating those data to full-scale flight conditions. The subject of this report will continue to be of concern even though capabilities in computational fluid dynamics are rapidly growing, and the recently dedicated National Transonic Facility at the Langley Research Center will provide much increased test Reynolds numbers. Author (GRA)

N85-15138# Cairo Univ. (Egypt).
CURRENT STATUS OF BLAST WAVE THEORY AND COMPUTATIONS. VOLUME 2: THE QUASI-SIMILAR SOLUTION
M. M. Kamel and A. M. A. Raour Mar. 1984 334 p
(Contract DAJA37-80-C-0342)
(AD-A146538; R/D-2689-AN) Avail: NTIS HC A15/MF A01 CSCL 19/4

In this volume, after a concise introduction in Chapter 1, the basic blast wave equations are presented in Chapter 2. A novel treatment of the quasi-similar formulation, presenting it as a zero order solution to a double Taylor's series expansion is presented in Chapter 3. Applications are then presented in Chapter 4 which is divided into six parts. The first two parts include solutions to the adiabatic point explosion problem, the latter being an analytical closed form solution. The third part deals with blast waves in real gases, where the formulation is presented here in more details than that presented in Volume 1. Blast waves in a detonating medium is included in the fourth part, with energy added in the

front. Blast waves in reactive media where the detonation energy is released in a specially varying fashion, are given in the fifth part. Finally, in the sixth part, the effects of viscosity, heat conduction and radiation on detonation are presented. GRA

N85-15139# Dayton Univ., Ohio.
PROCEDURES FOR TESTING AND EVALUATING SPACECRAFT-TYPE HEAT PIPES Interim Report, 10 Aug. - 31 Dec. 1983
L. K. Tower and W. B. Kaufman Wright-Patterson AFB, Ohio AFWAL Apr. 1984 69 p
(Contract F33615-81-C-2012)
(AD-A146671; AFWAL-TR-84-2029) Avail: NTIS HC A04/MF A01 CSCL 13/1

This report describes part of an effort to develop dependable, cost effective spacecraft thermal control heat pipes. In the program the reliability and performance of 30 commercially available heat pipes were assessed. The pipes comprised 10 groups of varying design, with aluminum and stainless steel as structural materials, and methanol and ammonia as working fluids. The factors studied were noncondensible gas accumulation and heat transfer capability in one g. The present report supplements a brief earlier report by describing in detail the procedures required to conduct a comprehensive evaluation of heat pipes for thermal control. It discusses the test facilities and testing procedures. The manner in which data may be taken for estimating useful life and comparing performance is described. Some of the pitfalls in making such judgments are illustrated. Originator supplied keywords include: heat transfer, and corrosion. GRA

N85-15140# Cornell Univ., Ithaca, N.Y. School of Applied and Engineering Physics.
CHANNEL CONSTRUCTED TO PROVIDE WELL DEFINED BOUNDARY LAYERS FOR VORTICITY OPTICAL PROBE MEASUREMENTS Progress Report
R. D. Ferguson and W. W. Webb 13 Aug. 1984 12 p
(Contract N00014-83-K-0460)
(AD-A146679) Avail: NTIS HC A02/MF A01 CSCL 20/4

In the period of fall 1983/spring 1984 the authors were predominantly concerned with the design, construction and testing of a new large scale flow system. It appears from preliminary examination that this flow system generates a turbulent boundary layer suitable for wide ranging study of vorticity dynamics. Verification that the flow exhibits normal boundary layer characteristics with both flow visualization and hot-film anemometry is under way. The Vorticity Optical Probe provides a measure of local vorticity fluctuations. It is based upon the tendency of small spherical particles to rotate with angular velocity, omega, as omega = W/2 determined by the local fluid vorticity W. To measure the particle rotation, plane mirrors (15 micron lead carbonate platelets) imbedded in about 25 micron Lucite (PMMA) spheres are the vorticity problem particles. Laser light reflected from the rotating particles allows the local vorticity to be deduced. Clearly, the refractive index of the working fluid must be matched to that of the polymethyl methacrolate particles (n=1.49) to eliminate refraction at their spherical surfaces. The choice of working fluid to match the particle refractive index has a direct effect on the flow system construction design and materials selection: the authors selected a 60 wt.% aqueous solution of ZnI2 (zinc iodide) with n=1.49, density rhonu=0.01 sq cm/sec. This fluid is moderately corrosive, perhaps comparable with sea water, but it does appear practicable for use in moderate scale flow systems and thus extends the usefulness of the vorticity probe. These along with other physical considerations are discussed in part 2. GRA

N85-15141# Oak Ridge National Lab., Tenn. Chemical Technology Div.
TURBULENT SHEAR FIELDS FOR DISPERSION OF AQUEOUS DROPS IN ORGANIC LIQUIDS AND APPLICATION TO GEL-SPHERE PROCESSES
Paul A. Haas and Victor L. Fowler 1984 32 p refs Presented at the Intern. Synfuels Policies and Technol. Symp., Philadelphia, 19-22 Aug. 1984; sponsored by AIChE Submitted for publication
(Contract DE-AC05-84OR-21400)
(DE84-016562; CONF-840828-4) Avail: NTIS HC A03/MF A01

Gel sphere processes which require the formation of aqueous drops in organic liquids with controlled and predictable diameters are discussed. Three types of turbulent shear devices, a simple tube, motionless mixer units, and a rotating annular disperser with couette flow, were applied. The size distribution data are correlated by dimensionless equations of similar forms. DOE

N85-15142# Los Alamos Scientific Lab., N. Mex.
VORT: A COMPUTER CODE FOR BUBBLY TWO-PHASE FLOW
T. L. Cook and F. H. Harlow Jul. 1984 96 p refs
(Contract W-7405-eng-36)
(DE84-017076; LA-10021-MS) Avail: NTIS HC A05/MF A01

The VORT computer program was developed for numerical solution of the time varying dynamics of a two field system. The current status of physical and mathematical modeling is presented in detail for a bubbly liquid. The numerical solution technique is described and a computer program is given along with instructions for its use. Application of the code to a von Karman vortex street is illustrated by two sample calculations. Comparisons with experimental observations are excellent. DOE

N85-14973# Joint Publications Research Service, Arlington, Va.
DISPERSION CURVES FOR NORMAL WAVES IN CYLINDRICAL SHELL AND CONDITIONS FOR SPATIAL COINCIDENCE IN VICINITY OF CRITICAL FREQUENCIES Abstract Only
V. V. Muzychenko, A. P. Paniklenko and S. A. Rybak *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 39 Transl. into ENGLISH from Akust. Zh. (Moscow), v. 30, no. 1, Jan.-Feb. 1984 p 83-88 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14975# Joint Publications Research Service, Arlington, Va.
INTENSIFICATION OF CONVECTIVE HEAT TRANSFER BY MEANS OF ARTIFICIAL SURFACE ROUGHNESS Abstract Only
A. A. Zhukauskas *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 40 Transl. into ENGLISH from Teploenergetika (Moscow), no. 3, Mar. 1984 p 10-14 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14980# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF COMPLEX INTERACTION OF SHELL OF REVOLUTION AND ITS FILLER WITH ALLOWANCE FOR FRICTION Abstract Only
V. F. Maksimov and A. B. Kiselev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 44 Transl. into ENGLISH from Vestn. Mos. Univ. Ser. 1: Mat., Mekhan. (Moscow), no. 2, Mar.-Apr. 1984 p 85-89 Previously announced as A84-31770 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N85-15143 Department of the Air Force, Washington, D.C.
PRECISION DIGITAL SAMPLER Patent
J. P. Belton, Jr., inventor (to Air Force) Issued 17 Apr. 1984 5 p Supersedes AD-D005682

(AD-D011285; US-Patent-4,443,766; US-Patent-Appl-SN-958920; US-Patent-Class-328-151) Avail: US Patent and Trademark Office CSCL 09/5

A precision digital sampler utilizes a sample rate clock providing pulses driving a tapped delay line where the total delay equals the Pulse Repetition Interval of the sample clock. The outputs of the tapped delay line are tied to a buffer register having a storage cell for each delay line tap. The data from the delay line is stored in the register on receipt of a command signal designated sample initiate command. In storing the outputs of the delay line, the state of the sample clock is known to the resolution of the taps. A decoder studies the states and the time for locating the leading edge of the sample clock is calculated. The calculated time is used by a control switching circuit to determine which tap should be enabled. The leading edge of the sample clock is thus enabled at the resolution of the delay line taps. Author (GRA)

N85-15144*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF LIGHT SOURCE AND SCATTERING MEDIUM RELATED TO VAPOR-SCREEN FLOW VISUALIZATION IN A SUPERSONIC WIND TUNNEL
Walter L. Snow and Odell A. Morris Dec. 1984 66 p refs
(NASA-TM-86290; L-15836; NAS 1.15:86290) Avail: NTIS HC A04/MF A01 CSCL 14B

Methods for increasing the radiant in light sheets used for vapor screen set-ups were investigated. Both high-pressure mercury arc lamps and lasers were considered. Pulsed operation of the air-cooled 1-kW lamps increased the light output but decreased reliability. An ellipsoidal mirror improved the output of the air-cooled lamps by concentrating the light but increased the complexity of the housing. Water-cooled-4-kW lamps coupled with high-aperture Fresnel lenses provided reasonable improvements over the air-cooled lamps. Fanned laser beams measurements of scattered light versus dew point made in conjunction with successful attempts to control the fluid injection. A number of smoke generators are described and test results comparing smoke and vapor screens are shown. Finally, one test included a periscope system to relay the image to a camera outside the flow. Author

N85-15145# Aeronautical Research Labs., Melbourne (Australia).
A PRELIMINARY STUDY OF USING A STRAIN-GAUGED BALANCE AND PARAMETER ESTIMATION TECHNIQUES FOR THE DETERMINATION OF AERODYNAMIC FORCES ON A MODEL IN A VERY SHORT DURATION WIND TUNNEL
A. P. Brown and R. A. Feik Dec. 1983 32 p
(AD-A146473; ARL/AERO-TM-358) Avail: NTIS HC A03/MF A01 CSCL 20/4

This memo presents a preliminary study of a proposed method of measuring the aerodynamic forces on a supported model in an intermittent very short duration wind tunnel with a relatively high airflow dynamic pressure (of the orders of 200 microsec and 1/3 atmosphere respectively). A semiconductor strain gauged cantilever beam balance is used to record strain time histories associated with model displacement in response to aerodynamic force. The practical feasibility of obtaining sufficiently resolvable strains for the prescribed tunnel conditions with the given strain gauge configuration is established. The proposed method uses a system identification procedure to determine the system dynamic response characteristics using a known calibration force input. Subsequently, aerodynamic forces during a tunnel run follow from the recorded strain gauge time histories. The procedure has been demonstrated successfully using simulated data. However, the experimental situation did not lead to a successful analysis in the way proposed. Reasons for this are discussed and recommendations made for improvements. A brief series of shots in the ANU free piston shock tunnel also highlights the need to isolate as much as possible the model/balance from external vibrations.
Author (GRA)

N85-15146# Oklahoma State Univ., Stillwater. Dept. of Chemistry.
INSTRUMENTS FOR CHARACTERIZATION OF CARBON BLACK AND POLYMERS Final Report, 15 Jul. 1983 - 14 Jul. 1984
W. T. Ford and M. G. Rockley 12 Sep. 1984 4 p
(Grant DAAG29-83-G-0099)
(AD-A146475; ARO-20962.1-CH-RI) Avail: NTIS HC A02/MF A01 CSCL 11/9

A Fourier transform infrared spectrometer spectometer and a thermal analysis system composed of differential scanning calorimeter, thermogravimetric balance, and data station are in use for the study of species adsorbed to carbon black and of polymer networks. GRA

N85-15147# Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
WAVELENGTH CODED IMAGE TRANSMISSION AND HOLOGRAPHIC OPTICAL ELEMENTS Final Technical Report, 1 Feb. 1981 - 30 Apr. 1984
S. K. Case 20 Aug. 1984 36 p
(Contract DAAG29-81-K-0033)
(AD-A146490; UM-ARO-AFOSR-1; ARO-17612.12-PH) Avail: NTIS HC A03/MF A01 CSCL 20/6

The results of a three year optics research program are described. Research was initially performed on wavelength coded image transmission. The goal of the program was to study various methods and systems for encoding object information in a wavelength multiplexed form so that the various wavelengths could be transmitted through a non-imaging media such as fog or a fiber optic and later spatially repositioned to reassemble an image of the original object. Such a system could be used to transmit image information at higher data rates and/or to transmit images through fewer optical channels. During the second year, the program was augmented to include research on a new type of holographic optical element called a multifact hologram. Such holograms consist of a large number of small, adjacent holograms (facets) which collectively diffract light to produce a desired output. These elements share some of the flexibility advantageous to Computer Generated Holograms with the high optical efficiency inherent in interferometrically recorded volume holograms. A computer controlled recording system was built to fabricate these elements. A number of space-variant image operations not possible with conventional optics were demonstrated using multi-facet holograms. Author (GRA)

N85-15148# Harry Diamond Labs., Adelphi, Md.
PULSED-POWER SYSTEM DIAGNOSTICS: ELECTROMAGNETIC DATA INTERPRETATION ALONG PULSE LINES
G. A. Huttlin Sep. 1984 22 p
(Contract MIPR-84-552; DA Proj. G37-IMXG)
(AD-A146607; HDL-TM-84-8) Avail: NTIS HC A02/MF A01 CSCL 14/2

The voltage and current at any position in a transmission-line pulser can be calculated from arbitrary voltage and current pulse shapes measured at one position in the pulse line. A simple closed-form method for doing this is discussed. This method is particularly amenable to a computer-driven transient-digitizer system. At the Harry Diamond Laboratories Aurora Facility this method is implemented in the PDP 11/60 program, VANDALS, and is used for the inter-comparison of sensors along the transmission path in the vacuum region of the pulser. For slowly varying pulses this method is seen to reduce to the addition of an inductive correction term to the measured voltage.
Author (GRA)

N85-15149# IBM Research Lab., San Jose, Calif.
INVESTIGATIONS OF PHOTOCHEMISTRY USING HOLOGRAPHY AND PHOTOACOUSTIC SPECTROSCOPY Final Report, Aug. 1981 - Jul. 1984
G. C. Bjorklund, H. Coufal, and D. M. Burland 28 Sep. 1984 5 p
(Contract N00014-81-C-0418)
(AD-A146637) Avail: NTIS HC A02/MF A01 CSCL 07/5

The work supported by this contract had as its primary goal the development of a holographic technique for the investigation of the details of photochemical reactions. The technique involves imbedding a molecule whose photochemistry we wish to study

into a polymer or other host material. By exposing this system to the radiation from interfering laser beams one can produce a hologram in the material. By following the growth in scattering efficiency of the hologram as a function of time, one can study the underlying photochemistry producing the holographic technique is particularly useful in investigating two-photon photochemical process, i.e., processes that require the stepwise absorption of two photons. GRA

N85-15150# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
ADVANCED MASS SPECTROMETERS FOR HYDROGEN ISOTOPE ANALYSES
Philippe Chastagner, comp. Jun. 1984 90 p refs
(Contract DE-AC09-76SR-00001)
(DE85-000716; DP-1674) Avail: NTIS HC A05/MF A01

Two advanced prototype mass spectrometers for the accurate analysis of mixtures of the hydrogen isotopes were evaluated. The GAZAB is a large double-focusing instrument with a resolution of 2000 at mass 4 and an abundance sensitivity of greater than 100,000 for the HT-D2 doublet. The MAT 250 HDT is a smaller, simpler, stigmatic focusing instrument with exceptionally high ion intensities for high signal-to-noise ratios. Both instruments are computer controlled. Once a scan is started, peak switching, scanning, mass discrimination control, data collection, and data reduction are done without operator intervention. Utility routines control hysteresis effects and instrument calibration. A containment facility, with dual inlet systems and a standard distribution system, permits testing with tritium mixtures. A recovery system prevents the release of tritium to the environment. The performance of the mass spectrometers was essentially equal under simulated process control conditions. Precision and accuracy for the D/T ratio was less than 0.5%. R.S.F.

N85-15151# Stanford Linear Accelerator Center, Calif.
OPERATIONAL PROBLEMS WITH RADIATION SURVEY METERS: THE UNIVERSITY AND ACCELERATOR
R. C. McCall Jun. 1984 12 p refs Presented at Workshop on Radiation Survey Instr. and Calibrations, Gaithersburg, Md., 10 Jul. 1984
(Contract DE-AC03-76SF-00515)
(DE84-015703; SU-SLAC-Pub-3365; CONF-840774-1) Avail: NTIS HC A02/MF A01

Problems encountered with commercial survey meters are described. The desired qualities of such instruments for use around accelerators are listed. Attempts to meet the accelerator monitoring needs by modifying commercial instruments and by in-house research and development are described. DOE

N85-15152# California Univ., Livermore. Lawrence Livermore Lab.
LASER ILLUMINATED NANO-SECOND MICROSCOPE
Alan M. Frank and Donald F. Hein 17 Aug. 1984 9 p refs Presented at the 16th Intern. Congr. on High Speed Photography and Photonics, Strasbourg, 27-31 Aug. 1984 Submitted for publication
(Contract W-7405-eng-48)
(DE84-016200; CONF-840887-1; UCRL-90416) Avail: NTIS HC A02/MF A01

In high magnification systems, laser speckle limits the resolution of laser illuminated targets. A broad bandwidth laser illuminator which substantially reduces the speckle was developed. This laser was incorporated with intensified camera technology and suitable lensing to provide a microscope system with good resolution over a 75-mm diameter image. The microscope currently has a 2-ns exposure onto film with magnification adjustable between 5X and 50X. DOE

N85-15153# California Univ., Livermore. Lawrence Livermore Lab. Fusion Experiments Program.
A MICROCHANNEL PLATE STREAK CAMERA
C. L. Wang, H. Meddecki, C. P. Hale, G. R. Leipelt, S. W. Thomas, and J. D. Wiedwald 15 Aug. 1984 11 p refs Presented at the 16th Intern. Congr. on High Speed Photography and Photonics, Strasbourg, 27-31 Aug. 1984
(Contract W-7405-eng-48)
(DE84-016536; UCRL-90393; CONF-840887-5) Avail: NTIS HC A02/MF A01

The development of a streak camera using microchannel plate electron multiplier as the cathode is presented. Potential applications to (GAMMA)-rays, low energy X-rays and charged particles are described. Preliminary test shows that 150 ps resolution can be obtained. DOE

N85-15154# Oak Ridge National Lab., Tenn.
EFFECTS OF TEMPERATURE ON THE RESPONSE TIME OF THERMOCOUPLES AND RESISTANCE THERMOMETERS
1984 19 p refs Presented at Indus. Temp. Meas. Symp., Knoxville, Tenn., 10 Sep. 1984
(Contract DE-AC05-84OR-21400)
(DE84-016855; CONF-8409109-2) Avail: NTIS HC A02/MF A01

The response times of sheathed thermocouples and platinum resistance thermometers both bare and in thermowells were measured at temperatures up to 650(0) C using plunge tests and an in situ loop current step response (LCSR) measurement technique. Both methods of measurements agreed over a wide range of sensor sizes and response times, verifying the LCSR method. The response times were temperature dependent. The magnitude and direction of the temperature dependence of response time varies from sensor to sensor. The response time of the sensor at the operating conditions must be measured when the sensor is at operating temperature. DOE

N85-15155# California Univ., Livermore. Lawrence Livermore Lab.
IMPROVEMENTS IN AVALANCHE-TRANSISTOR SWEEP CIRCUITRY FOR ELECTROOPTIC STREAK CAMERAS
S. W. Thomas, R. L. Griffith, and W. R. McDonald 31 Aug. 1984 8 p refs Presented at the 16th Intern. Congr. on High Speed Photography and Photonics, Strasbourg, 27-31 Aug. 1984
(Contract W-7405-eng-48)
(DE84-016195; UCRL-90491; CONF-840887-4) Avail: NTIS HC A02/MF A01

The performance of the avalanche transistor deflector driver (sweep) circuitry used in the high speed, electrooptic streak camera was improved. In the previous design for the sweep circuit, trigger to output delay time drifted on some cameras. This delay drift is a function of a somewhat randomly unstable breakdown voltage of some avalanche transistors. Both temperature and differences in manufacturing methods for transistors affect this instability. However, a significant improvement in system performance is achieved by long term burn in and by selection of only the most stable transistors for the sweep circuit. The peak to peak sweep voltage was increased about 80% by increasing the number of avalanche transistors in the string and raising the Q of the resonant circuit resulted in an improvement in sweep uniformity. Design equations for selecting components are given. Fast recovery diodes are used to prevent undershoot and to keep the beam out of the intensifier field of view until after the intensifier is gated off. The sweep time range is extended to over 100 ns. DOE

N85-15156# SRI International Corp., Menlo Park, Calif.
DEVELOPMENT OF A VAN-PORTABLE REMOTE-SENSING LASER SYSTEM FOR SELECTIVE DETECTION OF NATURAL GAS LEAKS Annual Report, May 1982 - Apr. 1984
A. Rosengreen and J. vanderLaan Apr. 1984 71 p refs Sponsored by Gas Research Inst.
(PB85-101939/GAR; GRI-84/0116) Avail: NTIS HC A04/MF A01 CSCL 14B

A mobile leak-survey system was developed for gas mains buried in the street that is faster and more efficient than existing systems. The feasibility of the laser remote-sensing technique for selective detection of leaking natural gas was demonstrated. A laser breadboard system was developed using a spectral differential absorption technique for detection of ethane from natural gas leaks. The system was then successfully demonstrated using an outdoor

simulated gas leak. To estimate system performance, a preliminary system analysis was performed. GRA

N85-15157# National Bureau of Standards, Washington, D.C.
EXPERIMENTATION AND MEASUREMENT
W. Y. Youden Mar. 1984 132 p refs
(PB84-233659; LC-84-601011) Avail: NTIS HC A07/MF A01; also available SOD HC $3.75 CSCL 14B

This book is an elementary introduction to the laws of measurements. But the approach is not an abstract discussion of measurements, instead it depends upon getting you to make measurements and by observing collections of measurements, to discover for yourself some of the properties of measurements. The idea is to learn something about measurement that will be useful-no matter what is being measured. Some hint is given of the devices that scientists and measurements specialists use to get more out of the available equipment. Understanding something about the laws of measurements, a person may be able to get the answers to your own research problems with half the usual amount of work. No young scientist can afford to pass up a topic thay may double his scientific achievements. GRA

N85-15006# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF LATERAL-SCAN INTERFEROMETER Abstract Only
B. A. Dubinskiy and S. O. Kuzmin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 11 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1480-1483 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15007# Joint Publications Research Service, Arlington, Va.
SOFTWARE FOR CRIMEA-PUSHCHINO RADIOINTERFEROMETER Abstract Only
L. R. Kogan and L. S. Chesalin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 11-12 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1483-1486 Original language doc. previously announced in IAA as A84-20818 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15029# Joint Publications Research Service, Arlington, Va.
OPTICAL METHOD OF MEASURING VELOCITY OF SHEAR WAVES Abstract Only
V. I. Arkhipov, A. N. Bondarenko, and A. I. Kondratyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 38-39 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 27-28 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15031# Joint Publications Research Service, Arlington, Va.
INFRALOW-FREQUENCY DIGITAL PHASE METER Abstract Only
A. A. Anepir, Ye. A. Anepir, O. I. Gutorov, V. N. Zainchkovskiy, and Yu. G. Mikhaylov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 40 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 41-43 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15032# Joint Publications Research Service, Arlington, Va.
APPARATUS FOR MEASURING DIELECTRIC CHARACTERISTICS OF POLYMER MATERIALS IN MILLIMETRIC RANGE OF WAVELENGTHS AT 4.2-300 K TEMPERATURES Abstract Only
A. P. Geppe, V. S. Dobromyslov, V. V. Kostromin, and D. Ya. Galperovich *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 41-42 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 57-58 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15033# Joint Publications Research Service, Arlington, Va.
DEVICE FOR FREQUENCY STABILIZATION OF MICROWAVE OSCILLATORS Abstract Only
V. I. Yevgrafov and A. F. Simonyuk *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 42 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 61-62 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15037# Joint Publications Research Service, Arlington, Va.
BUILDUP OF OSCILLATIONS IN TWO-MODE GYROTRON Abstract Only
V. Ye. Zapevalov and G. S. Nusinovich *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 46 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 117-120 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15038# Joint Publications Research Service, Arlington, Va.
HOLOGRAM BLEACHING Abstract Only
N. L. Kosobokova and G. P. Fayerman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 51 Transl. into ENGLISH from Zh. Nauch. i Prikl. Fotografii i Kinematografii (Moscow), v. 29, no. 1, Jan.-Feb. 1984 p 52-56 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15039# Joint Publications Research Service, Arlington, Va.
RECORDING HOLOGRAMS ON THIN FILMS OF TITANIUM DIOXIDE Abstract Only
Yu. V. Nechepurenko, A. M. Polikanin, V. G. Sokolov, G. A. Branitskiy, and B. A. Budkevich *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 51 Transl. into ENGLISH from Zh. Nauch. i Prikl. Fotografii i Kinematografii (Moscow), v. 29, no. 1, Jan.-Feb. 1984 p 70-72 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15083# Joint Publications Research Service, Arlington, Va.
AUTOMATIC CORRECTION OF STATIC CHARACTERISTICS OF MEASUREMENT CHANNEL OF DIGITAL OSCILLOGRAPH
A. M. Berkutov and Yu. D. Matyukhin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 66-72 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Prib. (Leningrad), v. 27, no. 4 p 3-8 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

N85-15084# Joint Publications Research Service, Arlington, Va.
A NOISE-SUPPRESSING DIGITAL FREQUENCY METER
V. S. Gutnikov and A. I. Bukman *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 77-82 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Prib. (Leningrad), v. 27, no. 4, Apr. 1984 p 8-12 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N85-15158 Department of the Air Force, Washington, D.C.
HIGH ENERGY LASER MIRROR Patent
J. D. Wells, inventor (to Air Force) Issued 17 Apr. 1984 4 p Supersedes AD-D009365
(AD-D011255; US-Patent-4,443,059; US-Patent-Appl-SN-339257; US-Patent-Class-350-310) Avail: US Patent and Trademark Office CSCL 20/5

A high energy laser mirror-heat exchanger is described which comprises a faceplate supporting a mirrored surface, a manifold plate adjacent the faceplate and defining a plurality of passageways for distributing fluid coolant to the adjacent faceplate surface, a

heat exchanger adjacent the manifold plate having a plurality of wall members configured in a isogrid configuration which may define a plurality of triangularly shaped passageways therebetween for conducting coolant to the manifold plate the intersections of said wall members defining a plurality of insulated passageways for conducting coolant away from said manifold plate, and a backing plate attached to the heat exchanger including coolant inlet and outlet means. Author (GRA)

N85-15159 Department of the Air Force, Washington, D.C.
HIGH POWER METAL VAPOR LASER Patent
B. G. Bricks, inventor (to Air Force) Issued 10 Apr. 1984 5 p Supersedes AD-D009274
(AD-D011271; US-Patent-4,442,523; US-Patent-Appl-SN-331750) Avail: US Patent and Trademark Office CSCL 20/5

A metal vapor laser, and, in particular, a lead vapor laser having a main discharge tube mounted within a pair of electrode support collars is discussed. A discharge electrode is mounted at one end of the laser which is sealed by a conventional window and reflector assembly. One of a pair of recirculating wick structures is situated adjacent the discharge electrode and is supported by an elongated support collar outside of and adjacent to the end of the main discharge tube. In addition, this wick structure is isolated from the support collar by a separate auxiliary tube. The auxiliary tube is situated in abutting relationship with the end of the discharge tube. This recirculating wick structure does not protrude into the main discharge tube and is kept separate therefrom. A metal foil thermal shield is isolated from the main discharge tube and electrode collar by insulating standoffs. Such an arrangement allows for a high output lead vapor laser in which discharge tube breakage is essentially nonexistent. GRA

N85-15160*# Westinghouse Research and Development Center, Pittsburgh, Pa.
LASER-ASSISTED SOLAR CELL METALLIZATION PROCESSING Quarterly Report, 13 Mar. - 12 Jun. 1984
S. Dutta and P. G. McMullin 20 Aug. 1984 41 p refs
(Contract NAS7-100)
(NASA-CR-174213; DOE/JPL-956615-84/3; NAS 1.26:174213; DE85-001706) Avail: NTIS HC A03/MF A01 CSCL 20E

Laser assisted processing techniques, utilized to produce fine, metal grid patterns for high efficiency solar cells, were developed. It is found that laser assisted pyrolysis of spun on silver neodecanoate is the most promising of all the metallization techniques investigated. Early adhesion problems were solved by optimizing deposition parameters. Linewidth studies were carried out as a function of laser power, scan speed, and film thickness. Preliminary solar cells were fabricated and characterized using this metallization scheme. Silver neodecanoate films were decomposed of a pulsed UV laser and metal mask. The various models of localizing surface temperature rise in silicon due to laser heating were studied. The study and calculations of the silicon temperature rise resulting in decomposition of the spun on silver neodecanoate are presented. DOE

N85-15161# JAYCOR, Alexandria, Va.
ANALYSES OF ENERGY EXTRACTION EFFICIENCY OF UNSTABLE RESONATORS Final Report, 12 Sep. 1983 - 11 Mar. 1984
J. T. Lin 30 Mar. 1984 46 p
(Contract N00014-83-C-2314)
(AD-A146391; AD-E001722; JAYCOR-J206-84-005/6239) Avail: NTIS HC A03/MF A01 CSCL 20/5

Energy extraction efficiency of a telescopic resonator is studied both analytically and numerically. It is shown that the usual Rigrod type calculations are not valid for systems with curved mirrors. A generalized Rigrod analysis is presented and compared with the numerical results. Experimental measurements related to NRL's laser systems are proposed based on the present modeling. GRA

N85-15162# Avco-Everett Research Lab., Mass.
PULSED ELECTRIC DISCHARGE LASER TECHNOLOGY. ELECTRON BEAM WINDOW FOIL MATERIAL Final Report, 28 Jan. 1983 - 15 Jan. 1984
M. W. McGeoch, A. J. DeFuria, and C. T. Pike Jan. 1984 122 p
(Contract DAAH01-82-D-A013)
(AD-A146420; DRSMI/RH-CR-84-13) Avail: NTIS HC A06/MF A01 CSCL 20/5

An experimental and theoretical study of titanium alloy foil windows is described. The alloys considered are Ti 15-3-3-3, Ti 3-2.5, and CP Ti(4). The foil thickness ranges from 0.5 mil to 1.0 mil. Tensile strength data is presented for 75 deg F and 600 deg F. High-cycle 10 to the 7th power fatigue data is presented for Ti 15-3-3 and Ti 3-2.5 at 75 deg F and 600 deg F. Crystal structures are shown for all the alloys. Measurements of the biaxial, or membrane, strength of the alloys is presented. A simulation of laser pulsed overpressure conditions is described, and the foil fatigue under these conditions is documented. GRA

N85-15163# Brookhaven National Lab., Upton, N. Y. National Synchrotron Light Source.
A PROTON LASER ACCELERATOR BY MEANS OF THE INVERSE FREE ELECTRON LASER MECHANISM
W. Zakowicz Jul. 1984 12 p refs
(Contract DE-AC02-76CH-00016)
(DE85-000231; BNL-35084) Avail: NTIS HC A02/MF A01

The inverse free electron laser accelerator which is considered to be a potential high gradient electron accelerator is discussed. In this accelerator electrons oscillating in the magnetic field of a wiggler can gain energy from a strong laser beam propagating collinearly. The same mechanism of acceleration works for protons and all other heavier particles. It is expected that the proton acceleration will be less effective, as it is more difficult to wiggle a heavier particle. This less efficient coupling of the proton and laser beam is partly compensated by the negligible radiative losses. These losses impose restrictions on the electron acceleration above 100 GeV. DOE

N85-15164# Oak Ridge National Lab., Tenn. Solid State Div.
TIME-RESOLVED STUDIES OF ULTRARAPID SOLIDIFICATION OF HIGHLY UNDERCOOLED MOLTEN SILICON FORMED BY PULSED LASER IRRADIATION
D. H. Lowndes, G. E. Jellison, Jr., R. F. Wood, and R. Carpenter (Arizona State Univ.) 20 Jul. 1984 6 p refs Presented at the 17th Intern. Conf. on the Phys. of Semiconductors, San Francisco, 6-10 Aug. 1984
(Contract DE-AC05-84OR-21400)
(DE84-016664; CONF-840879-5) Avail: NTIS HC A02/MF A01

Results of nanosecond resolution time resolved optical reflectivity measurements, during pulsed excimer (KrF, 248 nm) laser irradiation of Si implanted amorphous (a) silicon layers are reported. Model calculations and postirradiation TEM measurements, allow the study of both the transformation of a-Si to a highly undercooled liquid (l) phase and the subsequent ultrarapid solidification process. Author

N85-15165# Lambda Physik G.m.b.H., Goettingen (West Germany).
DEVELOPMENT OF PROTOTYPES FOR VERSATILE FAST DISCHARGE SYSTEMS FOR PULSED GAS LASERS, ESPECIALLY EXCIMER LASERS Final Report, Aug. 1981
Ernst Albers Bonn Bundesministerium fuer Forschung und Technologie Aug. 1984 60 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-174; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany 12.50

A fast compact discharge unit for excimer gas mixtures was developed. Due to an efficient charge transfer circuit and homogeneous discharge at high pressures, maximum output energy of 1J and average power > 50 W are achieved. Polarization of the output beam, a reduction in bandwidth by a factor of 250, and an improvement of the beam divergence are obtained by resonator schemes. An oscillator-amplifier experiment was performed at high

energy and high average power. By choosing suitable materials gas lifetime is increased. Author (ESA)

N85-14795# Joint Publications Research Service, Arlington, Va.
ESTIMATE OF NUCLEAR-PUMPED X-RAY LASER MECHANISM
Lu Renxiang *In its* China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 43-49 refs Transl. into ENGLISH from Hejubian Yu Dengliziti Wuli (Chongqing), v. 4, no. 4, Jun. 1984 p 86-90 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

N85-15026# Joint Publications Research Service, Arlington, Va.
DEVICE FOR MEASURING AVERAGE POWER OF LASER RADIATION Abstract Only
G. M. Gandelman, B. N. Levinskiiy, and R. R. Shurgaya *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 36 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 17-18 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15027# Joint Publications Research Service, Arlington, Va.
FORMATION OF REFERENCE SIGNALS IN LASER-TYPE GAS ANALYZERS WITH MECHANICAL SWITCHING OF OPTICAL CHANNELS Abstract Only
N. Yu. Melikov and V. A. Balakin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 36-37 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 18-19 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15028# Joint Publications Research Service, Arlington, Va.
MEASURING LARGE AMPLITUDES OF MECHANICAL VIBRATIONS WITH LASER INTERFEROMETERS Abstract Only
A. N. Bondarenko and V. P. Trotsenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 38 Transl. into ENGLISH from Izmeritelnaya Tekhn. (Moscow), no. 3, Mar. 1984 p 26-27 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15179# Joint Publications Research Service, Arlington, Va.
LASER-GUIDED MEASURING SYSTEM FOR PRECISIONING DEVICE
R. Schroeter *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-045) 13 Dec. 1984 p 53-62 refs Transl. into ENGLISH from Feingeraetetech. (East Berlin), v. 33, no. 9, 1984 p 410-412 (For primary document see N85-15175 06-37)
Avail: NTIS HC A04/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N85-15166 Department of the Army, Washington, D. C.
SAMPLING DEVICE Patent
D. G. Englar and R. G. Altman, inventors (to Army) Issued 8 May 1984 7 p
(AD-D011256; US-Patent-4,447,395; US-Patent-Appl-SN-348539; US-Patent-Class-422-68) Avail: US Patent and Trademark Office CSCL 13/9

An apparatus for processing and analyzing various liquids, such as blood serum, includes an idexable table for supporting a plurality of liquid sample containers. A probe is inserted into each sample container in succession. During probe insertion, a portion of the sample to be analyzed is withdrawn by the probe from the respective container and moved to a station where it can be analyzed and tested. The probe is then moved to a station where it can be washed prior to insertion into the next sample container. The drive mechanism for the apparatus is characterized by the fact that all indexing mechanisms and actuator cams are mounted on a single rotatable shaft and arranged such that each periodic function performed by the mechanism is directly coupled to the rotation of the shaft. Author (GRA)

N85-15167 Department of the Army, Washington, D. C.
MANIFOLD INSULATED WITH KNITTED IMPREGNATED SLEEVE Patent
R. L. Long, inventor (to Army) Issued 16 Dec. 1980 4 p
(AD-D011270; US-Patent-4,239,063; US-Patent-Appl-SN-891255)
Avail: US Patent and Trademark Office CSCL 21/7

A manifold with a knitted resin impregnated sleeve that is fabricated as a continuous unseamed configured sleeve and installed in the manifold to produce a seamless structure is discussed. The sleeve is knitted or woven from conventional materials and then installed in the manifold to provide insulation for the manifold structure. Author (GRA)

N85-15168*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NITRIDING OF TITANIUM AND ITS ALLOYS BY N2, NH3 OR MIXTURES OF N2 + H2 IN A dc ARC PLASMA AT LOW PRESSURES (< OR = TO TORR)
Reuven Avni Nov. 1984 23 p refs
(NASA-TM-83803; E-2254; NAS 1.15:83803) Avail: NTIS HC A02/MF A01 CSCL 11F

The dc glow discharges in different gas mixtures of Ar + N2, Ar + NH3 or Ar + N2 + H2 result in the surface nitriding of Ti metal and its alloy (Ti6Al4V). Various gas mixtures were used in order to establish the main active species governing the nitriding process, i.e., N, N2, NH, or NH2 as excited or ionized particles. The dc discharge was sampled and analyzed by quadruple mass spectrometry (QPMS) and optical emission spectroscopy (OES), and the nitrided samples were analyzed by scanning electron microscopy (SEM) with an EDAX attachment, microhardness, and Fourier transform infrared reflectance spectrometry (FTIR). It was found that the excited and ionized nitrogen and hydrogen atoms are the main species responsible for the nitriding process in a dc glow discharge. Author

N85-15169# Milwaukee School of Engineering, Wis. Fluid Power Inst.
A STUDY OF WEAR CHARACTERISTICS DUE TO PRESSURE FOR HYDRAULIC FIXED DISPLACEMENT VANE PUMPS Final Technical Report, Sep. 1982 - Sep. 1983
Oct. 1983 184 p
(Contract DAAK70-81-C-0002)
(AD-A146023; P/N-50468) Avail: NTIS HC A09/MF A01 CSCL 13/11

This project was undertaken to determine if the wear rate of a hydraulic vane pump can be correlated to its operating pressure. The correlation should be that the wear rate of the pump would be a linear function at low operating pressures and reach an exponential function of the pressure at some elevated pressure. According to MSO FPI Report no. 50423 dated July 15, 1982 MERADCOM contract no. DAAK70-81-C-0002, operating the pumps at test pressures of 115 percent of rated pressure caused normal wear of the pump. The pumps were broken-in using two different methods to determine if the wear rate operating pressure characteristics will differ for pumps that are broken-in at 3000 PSI for three hours compared to pumps that are broken-in at 500 PSI for three hours prior to running the wear rate test. There are two main considerations in performing the wear rate test. The first is to develop a test procedure. The test procedure consists of methods to determine the wear rate of the pump by utilizing on-hand laboratory equipment and instrumentation. The other consideration is to determine which types of oil analysis are suited to this project. Several methods were investigated and used to collect wear rate data through analysis of the pump's fluid. GRA

N85-15170# SKF Technology Services, King of Prussia, Pa.
EFFECT OF ASPERITY INTERACTIONS ON SCUFFING Final Report

J. I. McCool May 1984 126 p
(Contract N00140-80-C-1538)
(AD-A146544; SKF-AT83D013; NAPC-PE-94-C) Avail: NTIS HC A07/MF A01 CSCL 20/11

The objective of the investigation reported herein was to determine whether the characteristics of surface asperity interaction can be used to refine predictions of the load at which lubricated surfaces undergoing relative rolling and sliding, will scuff or smear. In this investigation a series of tests were run in a geared roller test machine using three combinations of rolling and sliding velocities, and for each velocity condition, a set of polished and ground rollers. A description of the test method is given in Appendix B. The measured surface characteristics were used as input to a simulation model, ASPERSIM, which computes the expected number of micro-contacts and the expected force and area of each. Significance tests showed that the polished specimens had lower average asperity force and average asperity area than the ground specimens and that these values were correspondingly lower for the unscuffed than for the scuffed tests.
GRA

N85-15171# Donovan, Hamester and Rattien, Inc., Washington, D. C.
ROBOTIC TECHNOLOGY: AN ASSESSMENT AND FORECAST
F. C. Brooks Jul. 1984 183 p
(Contract F33615-83-D-5083)
(AD-A146672) Avail: NTIS HC A09/MF A01 CSCL 01/3

Robotics will be a major driving force of the defense industrial base as industrial robots grow and mature into an integral part of next generation computer-integrated manufacturing processes. In this context, the Aerospace Industrial Modernization (AIM) Office of the Air Force Systems Command has been tasked to evaluate robotics technology as a means of improving the manufacturing technology base of the aerospace industry. Consequently, the AIM Office has recently initiated a technology assessment of robotics, of which the results are presented in the present report. The major objectives of this study are to: perform a critical assessment of the current status of the technology; review key worldwide R&D activities and discern the principal thrusts and trends in robotics R&D; and perform a technological forecast addressing future functional capabilities, emerging application areas and future directions of robotics producers and end-users. Author (GRA)

N85-15172# Army Construction Engineering Research Lab., Champaign, Ill.
RECOMMENDED ALUMINUM PIPE WELDING PROCEDURES FOR CORPS OF ENGINEERS CONSTRUCTION Final Report
R. A. Weber Sep. 1984 16 p
(DA Proj. 4A7-62731-AT-41)
(AD-A146712; CERL-TR-M-358) Avail: NTIS HC A02/MF A01 CSCL 13/8

An investigation of aluminum pipe welding techniques for field construction is documented. Information from the Aluminum Association and the Aluminum Company of America (ALCOA) was evaluated to see whether their methods would be feasible for use by the Army Corps of Engineers. These procedures were then tested on aluminum piping commonly used in Corps construction (6061-T6 and 3003-H18). The investigation verified that these methods were viable for military applications. The information gained during this investigation was used as a basis for recommending guidance on aluminum welding which can be incorporated into Corps of Engineers and Army welding guidance. Among these recommendations are: (1) Use of appropriate cleaning procedures on the joint before welding; (2) Use of push-button to control the weld contactor; (3) Use of the gas tungsten-arc welding process; (4) Use of the extended land joint configuration; and (5) Use of current limits set by the Aluminum Association and ALCOA.
Author (GRA)

N85-15173# Department of the Army, Washington, D. C.
VEHICLE ANCHORING SYSTEM Patent Application
J. L. Celentino, inventor (to Army) Filed 27 Jul. 1984 12 p
(AD-D011292; US-Patent-Appl-SN-635072) Avail: NTIS HC A02/MF A01 CSCL 13/3

A vehicle anchoring device is made with a hydraulic cylinder which is mounted on the vehicle and adapted to extend and retract a mounting arm. The mounting arm has an attachment head located on the outboard end of the mounting arm which is adapted to engage a complimentary anchor so as to hold the vehicle in a fixed position even when subjected to a large environmental stress.
GRA

N85-15174# Department of the Navy, Washington, D. C.
HYDRAULIC LOCKING BOLTWORK SYSTEM Patent Application
H. L. Self and T. L. Pickett, inventors (to Navy) Filed 20 Aug. 1984 10 p
(AD-D011299; US-Patent-Appl-SN-641189) Avail: NTIS HC A02/MF A01 CSCL 15/3

The invention relates to means for locking large or small doors, which must be carefully secured, with several deadbolts. In particular, the invention relates to a hydraulic boltwork system which includes detection and automatic relocking means should unauthorized manipulation be attempted. Present lockbolt systems are mechanically driven by gears or linkages which limit the number of deadbolts that can be operated, or are mechanical locks which incorporate an hydraulic latching system. Pneumatic latches use air which is compressible and thus can readily be forced open. Low pressure hydraulic latches have insufficient pressure to operate efficiently and are easily jammed. None of the prior art systems take advantage of the fact that liquids are incompressible and can become as rigid as a mechanical linkage for locking purposes, nor do they fully utilize the benefits of hydraulics to detect unauthorized lock manipulation. The prior art frequently uses inefficient mechanical linkages, or fluid pressure to open latch bolts and springs (which can easily be forced open) to close them. Efficient systems for locking the bolts closed are lacking.
GRA

N85-15175# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
13 Dec. 1984 70 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-045) Avail: NTIS HC A04/MF A01

Progress in Eastern European science and technology is reported. Topics discussed include: export of microelectronics; modernization and retraining in sciences; new concepts in industrial robots; machine tools; NC programming and machine tool information; laser guided measuring system for precision devices, and semiconductor development. For individual titles, see N85-15176 through N85-15179.

N85-15176# Joint Publications Research Service, Arlington, Va.
NEW CONCEPTS FOR INDUSTRIAL ROBOTS OUTLINED
H. Scheibner *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-045) 13 Dec. 1984 p 12-24 refs Transl. into ENGLISH from Fertigungstech. (East Berlin), v. 34, no. 7, 1984 p 392-396 (For primary document see N85-15175 06-37)
Avail: NTIS HC A04/MF A01

The automation in the small and medium production of machine construction which requires flexibility and high productivity and the expansion of CNC machine tools with equipment for automation of the flow of information and materials is discussed. With the introduction of numerically controlled machine tools and processing centers, the working process and tool changes were automated. The manual procedures include workpiece handling, workpiece checking, and checking of tool fracture and wear. It is necessary to decrease the need of operators to run the machine tools. Modern CNC performs these functions automatically. The advantages of these functions are: (1) reduction of auxiliary times; (2) better machine workload; (3) relieving the machine operator from monotonous and physically heavy work; and (4) increasing output while reducing operational and monitoring work. E.A.K.

N85-15177# Joint Publications Research Service, Arlington, Va.
MACHINE TOOLS AT 1984 LEIPZIG SPRING FAIR

In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-045) 13 Dec. 1984 p 25-44 Transl. into ENGLISH from Fertigungstech. (East Berlin), v. 34, no. 7, 1984 p 432-439 (For primary document see N85-15175 06-37)
Avail: NTIS HC A04/MF A01

Development of machine tools and export was examined. The displays on machine tools at the Leipzig Fair are described. The products cover the areas of: metallurgy, construction of heavy machinery and systems, machine tools and other tools, agricultural and foodstuff engineering, packing machinery and electrical, automation, and information engineering. It is noted that the production of microelectronic components and technological equipment is increasing which creates a broad and rapid development and application of microelectronics. The increased performance capability of the microelectronics industry expresses itself, in its supply of patents, licenses, know-how, and other scientific/technical results. E.A.K.

N85-15178# Joint Publications Research Service, Arlington, Va.
NC PROGRAMMING, MACHINE TOOL INFORMATION
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-045) 13 Dec. 1984 p 45-52 Transl. into ENGLISH from Fertigungstech. (East Berlin), v. 34, no. 7, 1984 p 440-443 (For primary document see N85-15175 06-37)
Avail: NTIS HC A04/MF A01

The development of numerical control programs for machine tools is described. In particular the program AUTOTECH-BOFR 11/DR 11 is described. It consists of a basic program with modified modules for individual control variables. E.A.K.

N85-15179# Joint Publications Research Service, Arlington, Va.
LASER-GUIDED MEASURING SYSTEM FOR PRECISIONING DEVICE **c36**
R. Schroeter *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-045) 13 Dec. 1984 p 53-62 refs Transl. into ENGLISH from Feingeraetetech. (East Berlin), v. 33, no. 9, 1984 p 410-412 (For primary document see N85-15175 06-37)
Avail: NTIS HC A04/MF A01

Laser position sensors (LWMS) are established as precision length comparison standards to measure geometric and kinematic parameters during the acceptance and routine checking of measuring equipment and machine tools, and for the performance of special position measuring tasks. Compared to conventional measurements, LWMS offers special advantages. The use of LWMS in industrial measurements allows extensive precise tests on measuring instruments and machine tools. A high degree of automation with short measuring times is a ideal presupposition for monitoring of machine tools, machine systems, coordinate measuring devices, and fine mechanical devices for microelectronics. E.A.K.

N85-14960# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF SHOT-PEENING METHODS ON SURFACE QUALITY AND SERVICE LIFE OF BEARINGS Abstract Only
N. D. Kuznetsov, V. I. Volkov, and V. A. Dmitriyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 22-23 Transl. into ENGLISH from Vestn. Mashinostr. (Moscow), no. 3, Mar. 1984 p 14-17 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14977# Joint Publications Research Service, Arlington, Va.
STABILITY OF LUBRICANT FILM IN GAS DYNAMIC BEARING Abstract Only
B. A. Arefyev, K. I. Gulyayev, and N. B. Talaykova *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 41 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), v. 27, no. 5, May 1984 p 63-68 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14990# Joint Publications Research Service, Arlington, Va.
TESTING THE ANTIFRICTION PROPERTIES OF ALLOYS FOR HEAVILY LOADED BEARINGS Abstract Only
P. I. Yamshanov and V. V. Lebedeva *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 51 Transl. into ENGLISH from Vestn. Mashinostr. (Moscow), no. 3, Mar. 1984 p 21-23 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N85-15180# Agora Systems, Inc., Gaithersburg, Md.
ANALYSES TO DEVELOP MODELS TO PROJECT FAILURE RATES AND REPAIR COSTS OF ELECTRONIC MODULES AND SUBASSEMBLIES
21 Sep. 1983 123 p
(Contract DAAB07-82-C-Q004)
(AD-A146509) Avail: NTIS HC A06/MF A01 CSCL 09/5

This report describes the work performed to develop failure rate and cost-to-repair models such that reliable estimates of the failure rate and repair/replacement costs of fielded systems can be generated based on information available during Advanced Development or at the beginning of Full Scale Development. This capability will assist logistics personnel develop more accurate failure rate prediction and budget cost requirements for Repair Depot inservice equipments when actual failure rate data and cost are not available. In addition, information obtained by exercising these models can be fed back to the Project Office to support requirements trade-offs in the areas of reliability testability and functional partitioning. GRA

N85-15181# Oak Ridge Y-12 Plant, Tenn. Instrumentation and Characterization Dept.
ULTRASONIC GIRTH WELD EVALUATION FOR ALUMINUM SUBSTRATE OF SPHERICAL KEVLAR-EPOXY TEST SPECIMENS
W. D. Brosey and T. W. Dews 28 Aug. 1984 18 p refs
(Contract DE-AC05-84OS-21400)
(DE85-001592; Y/DW-519) Avail: NTIS HC A02/MF A01

An ultrasonic weld inspection was developed for the girth weld of the aluminum substrate for a Kevlar-epoxy filament wound test specimen. The filament wound spheres are test coupons in a study to evaluate NDE techniques on a composite material with enclosed geometry. The girth weld of the aluminum substrate was examined to ensure the weld is not a weak point in the coupon in which failure will initiate. Analog and B-scan data are combined to determine the presence of lack of penetration, suckback, protrusion, or porosity in the weld. The data are calibrated with a standard and then plotted as analog, B-scan, on color contour data as a function of angular position around the weld. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N85-15182 United Kingdom Atomic Energy Authority, Risley (England).
TESTS OF THE LOAD-BEARING AND DEFORMATION BEHAVIOUR OF REINFORCED CONCRETE SPHERICAL SHELLS UNDER POINT LOADING
G. Plauk and H. Eifler 5 Jul. 1984 19 p refs Transl. into ENGLISH from Proc. of the 12th Res. Colloq. of the Deutscher Ausschuss fuer Stahlbeton, Mar. 1981 p 211-222

(BLL-Risley-Trans-4550-(9091.9)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The deformation and load-bearing behavior of reinforced concrete spherical shells under local static or impact point loading was investigated experimentally. One non-reinforced spherical shell section and two spherical shell sections with different types of reinforcement were considered. Results show that the fracture behavior and hence the energy absorption capacity of the shells can be influenced by the method and percentage of reinforcement. R.S.F.

N85-15183*# National Aeronautics and Space Administration, Washington, D. C.

SHOCK TESTING OF A NITROGEN TANK (CRYO DIFFUSION TYPE 220 VLR) ON THE MIDDLE WEIGHT SHOCK STAND

L. J. Wevers Dec. 1984 16 p Transl. into ENGLISH of "Schokbeproeving van een Stikstofvat (Cryo Diffusion Type 220 VLR) op de Middengewicht Schokbank" rept. 4848/27 Institute TNO for Mechanical Constructions, Delft, Netherlands, Nov. 1972 p 1-15 Original language document was announced as X73-80888 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)

(NASA-TM-77747; NAS 1.15:77747) Avail: NTIS HC A02/MF A01 CSCL 20K

Results of vertical and horizontal shock tests on type 200 VLR nitrogen tank are given. Author

N85-15184*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE USE OF AN OPTICAL DATA ACQUISITION SYSTEM FOR BLADED DISK VIBRATION ANALYSIS

Charles Lawrence and Erwin H. Meyn Dec. 1984 23 p refs

(NASA-TM-86891; E-2358; NAS 1.15:86891) Avail: NTIS HC A02/MF A01 CSCL 20K

A new concept in instrumentation was developed by engineers at NASA Lewis Research Center to collect vibration data from multi-bladed rotors. This new concept, known as the optical data acquisition system, uses optical transducers to measure bladed tip delections by reflection light beams off the tips of the blades as they pass in front of the optical transducer. By using an array of transducers around the perimeter of the rotor, detailed vibration signals can be obtained. In this study, resonant frequencies and mode shapes were determined for a 56 bladed rotor using the optical system. Frequency data from the optical system was also compared to data obtained from strain gauge measurements and finite element analysis and was found to be in good agreement. Author

N85-15185*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A COMPACT FINITE ELEMENT METHOD FOR ELASTIC BODIES Final Report

Milton E. Rose Nov. 1984 40 p refs

(Contracts NAS1-17070; NAS1-17130)

(NASA-CR-172487; ICASE-84-58; NAS 1.26:172487) Avail: NTIS HC A03/MF A01 CSCL 20K

A nonconforming finite method is described for treating linear equilibrium problems, and a convergence proof showing second order accuracy is given. The close relationship to a related compact finite difference scheme due to Phillips and Rose is examined. A condensation technique is shown to preserve the compactness property and suggests an approach to a certain type of homogenization. Author

N85-15186*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SENSITIVITY ANALYSIS OF DISCRETE STRUCTURAL SYSTEMS: A SURVEY

Howard M. Adelman and Raphael T. Haftka (Virginia Polytechnic Inst. and State Univ.) Dec. 1984 39 p refs

(NASA-TM-86333; NAS 1.15:86333) Avail: NTIS HC A03/MF A01 CSCL 20K

Methods for calculating sensitivity derivatives for discrete structural systems are surveyed, primarily covering literature published during the past two decades. Methods are described for calculating derivatives of static displacements and stresses, eigenvalues and eigenvectors, transient structural response, and derivatives of optimum structural designs with respect to problem parameters. The survey is focused on publications addressed to structural analysis, but also includes a number of methods developed in nonstructural fields such as electronics, controls, and physical chemistry which are directly applicable to structural problems. Most notable among the nonstructural-based methods are the adjoint variable technique from control theory, and the Green's function and FAST methods from physical chemistry. Author

N85-15187# National Aerospace Lab., Tokyo (Japan).

VERIFICATION OF A COMPUTER PROGRAM FOR VIBRATION ANALYSIS OF COMPOSITE WING CORES

Yoshio Noguchi and Takashi Ishikawa Jul. 1984 24 p refs In JAPANESE; ENGLISH summary

(NAL-TR-825; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

A finite element program developed for vibration analysis of composite wing cores was examined. Such cores are used in a research project on aeroelastic tailoring. The formulation of the finite element analysis is presented. Basic elastic moduli of composites are discussed to confirm their reliability of the input data for the verification. All moduli are determined by experimental procedures and theoretical bases of such experimentation are given. Composite wing cores are consolidated with unidirectional tapes into pure unidirectional plates of different fiber directions and multidirectional laminates. A flutter model is idealized as a composite plate with added lumped masses. E.A.K.

N85-15188# Cambridge Univ. (England). Dept. of Metallurgy and Materials Science.

ELASTIC FIELDS UNDER A SPHERICAL INDENTER Final Technical Report

E. H. Yoffe Mar. 1984 31 p

(Contract DAJA37-82-C-0171; DA Proj. 1T1-61102-BH-57)

(AD-A146519; R/D-4024-MS) Avail: NTIS HC A03/MF A01 CSCL 20/11

The elastic field in a half-space indented by a rigid sphere is accurately described by Hertz' equations if the contact radius is small compared with that of the sphere. For wider contact the equations are not expected to be reliable, but are nevertheless often used for convenience. This paper describes some of the errors which may develop as contact widens, and presents a second elastic field which provides a first order correction. From this it is possible to estimate the probable error introduced in a particular variable by applying the Hertz' equations beyond the recommended range. Some useful relations between some familiar elastic indentation fields are also reported. GRA

N85-15189# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.

CONSTITUTIVE MODELING OF ENGINE MATERIALS Final Report, Jul. 1981 - Oct. 1983

D. A. Wilson and K. P. Walker Wright-Patterson AFB, Ohio AFWAL Jul. 1984 84 p

(Contract F33615-81-C-5040)

(AD-A146630; AFWAL-TR-84-4073) Avail: NTIS HC A05/MF A01 CSCL 20/11

This investigation examines the capability to predict the growth of cracks in critical structural components operating at elevated temperatures where time-dependent behavior occurs. A viscoplastic constitutive model for INCO 718 was developed to determine this behavior in the area of the crack tip. The model constants were obtained from monotonically increasing, cyclic, and sustained loading. Therefore, the model has the capability to account for load history effects as well as material damage accumulation. Theoretical predictions are compared to the experimental results. Author (GRA)

N85-15190# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
ELASTODYNAMIC STRESS INTENSITY FACTORS OF AN INTERFACE FINITE-WIDTH CRACK
H.-J. P. Yang and D. B. Bogy Jul. 1984 16 p refs Presented at the Rev. of Progr. in Quantitative Nondestructive Evaluation Conf., San Diego, Calif., 9-13 Jul. 1984
(Contract DE-AC03-76SF-00098)
(DE84-016906; LBL-18051; CONF-840738-1) Avail: NTIS HC A02/MF A01

The plane strain, time harmonic problem of a single elastic layer of one material on a half space of a different material with a single crack at the interface is discussed. The derivation of the required Green's functions for dilational and rotational point sources in the uncracked layered half space are outlined. These functions are used with the appropriate form of Green's integral theorem to derive the scattered field potentials for arbitrary incident fields in the cracked layered half space. The potentials are used to reduce the problem to a system of singular integral equations to determine the gradients of the crack opening displacements in the scattered field. The integral equations are analyzed to determine the crack tip singularity, which is found, to be oscillatory, as in the corresponding static problem of an interface crack. For many material combinations of interest, however, the crack tip singularity in the stress field is one-half power, as for a homogeneous material. In the numerical work of this work attention is restricted to this class of composites and the integral equations are solved numerically to determine the Mode 1 and Mode 2 stress intensity factors as a function of a dimensionless wave number for various ratios of crack length to layer depth. DOE

N85-15191# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
MODELLING OF DEFORMATION AND FRACTURE IN HIGH-TEMPERATURE STRUCTURAL MATERIALS Final Report, 1 Feb. 1983 - 30 Jun. 1984
A. K. Miller 1984 122 p refs
(Contract DE-AT03-76ER-70057)
(DE84-016906; SU-DMS-84-R-3) Avail: NTIS HC A06/MF A01

Quantitative models which can predict fracture of metals and alloys were considered. Particular emphasis was placed on materials limited aspects of energy technology which, in turn, leads to an emphasis on predicting fracture of high temperature structural materials and fracture under complex histories and environments. The models developed in this project can be used either directly by high temperature structural design analysis for life prediction of specific components, or indirectly to guide the development of design rules, codes, etc. DOE

N85-15192# Oak Ridge National Lab., Tenn.
INCLINED DISLOCATION EMISSION AT A SHIELDED CRACK TIP
S. J. Chang and S. M. Ohr 1984 5 p refs Presented at Yamada Conf. on Dislocations in Solids, Tokyo, 27 Aug. 1984
(Contract DE-AC05-84OR-21400)
(DE84-016703; CONF-840892-1) Avail: NTIS HC A02/MF A01

Dislocation pileup along an inclined direction from a crack tip was observed in metals during tensile deformation in an electron microscope. Dislocations are emitted from the crack tip, move through a dislocation free zone and pileup in the plastic zone. The problem of inclined pileup of screw dislocations at a crack tip with a dislocation free zone was solved by applying the Wiener-Hopf method. The maximum value of K cos (psi/2), the inclined stress intensity, is used to discuss the most preferred direction of dislocation emission and the result of the crack tip blunting versus brittle extension. It is shown that the resistance constant K/sub g/ of dislocation emission for the material can be determined by measuring the size of the dislocation free zone. DOE

N85-15193# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics Div.
THREE-DIMENSIONAL CRACK LOCATION BY ACOUSTIC EMISSION
C. B. Scruby and G. R. Baldwin Jun. 1984 25 p refs
(AERE-R-11277) Avail: NTIS HC A02/MF A01

A four transducer transient recording system was used to detect acoustic emission events associated with the growth of a fatigue crack in a compact tension specimen of 7010 aluminum alloy. The location accuracy for the (x,y,z) coordinates of each event is + or - 0.5 mm. The principal emission source is believed to be inclusion fracture at, or close to, the tip of the crack, so that the locus of emission events provides an image of the position and shape of the crack front. Using this system, the crack was observed to grow during cyclic fatigue from 3.2 mm to 5.6 mm over the whole crack front. Author

N85-14981# Joint Publications Research Service, Arlington, Va.
VARIABLE LOADING OF ELASTIC-PLASTIC SHELLS OF REVOLUTION Abstract Only
S. I. Tarakanov *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 44 Transl. into ENGLISH from Vestn. Mosk. Univ. Ser. 1: Mat., Mekkan. (Moscow), no. 2, Mar.-Apr. 1984 p 67-71 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14982# Joint Publications Research Service, Arlington, Va.
STABILITY OF CIRCULAR CYLINDRICAL SHELL WITH PIECEWISE CONSTANT THICKNESS SUBJECTED TO RADIAL PRESSURE Abstract Only
Ye. A. Prokopyev and V. A. Ryabtsev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 45 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 97-100 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14984# Joint Publications Research Service, Arlington, Va.
DEFORMATION OF CYLINDRICAL SHELL WITH CANTILEVERED ELASTIC PLATES ATTACHED Abstract Only
B. A. Antufyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 46 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Aviats. Tekhn. (Kazan), no. 4, Oct.-Dec. 1983 p 80-82 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14986# Joint Publications Research Service, Arlington, Va.
STABILITY OF HOLLOW SHAFTS UNDER TORSION Abstract Only
V. I. Alekseyev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 48 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 1, Jan. 1984 p 58-62 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14987# Joint Publications Research Service, Arlington, Va.
SAINT VENANT CONDITIONS IN THEORY OF PIEZOELASTIC SHELLS Abstract Only
N. N. Rogacheva *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 48-49 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 302-306 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

42 GEOSCIENCES (GENERAL)

N85-15194# Department of Energy, Washington, D. C. Div. of Engineering, Mathematics and Geosciences.
SUMMARIES OF PHYSICAL RESEARCH IN THE GEOSCIENCES
Sep. 1984 161 p
(DE85-001882; DOE/ER-0145/2) Avail: NTIS HC A08/MF A01

The scope of the individual programs and detail the research

performed during 1983-1984 is summarized. The geosciences research program includes research in geology, petrology, geophysics, geochemistry, hydrology, solar terrestrial relationships, aeronomy, seismology, and natural resource analysis, including their various subdivisions and interdisciplineary areas. DOE

N85-15195# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite, Data, and Information Service.
ENVIRONMENTAL DATA INVENTORY FOR THE ANTARCTIC AREA
May 1984 33 p
(PB85-107944; NESDIS-ENVIRON-INVENTORY-1) Avail: NTIS HC A03/MF A01 CSCL 05B

Geophysical data; Meteorological data; Oceanographic data; Glaciology data and information are contained. GRA

N85-15196# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES
10 Dec. 1984 167 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UES-84-007) Avail: NTIS HC A08

Topics relating to meteorology, oceanography, geophysics, atmospheric physics, and arctic and antarctic regions are discussed. For individual titles, see N85-15197 through N85-15244.

N85-15197# Joint Publications Research Service, Arlington, Va.
PALEOCLIMATOLOGISTS USE PAST TO PREDICT WEATHER PATTERNS c47
Alexander Viktorov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 1-2 Transl. into ENGLISH from Nedelya (Moscow), no. 19, 7-13 May 1984 p 15 (For primary document see N85-15196 06-42)
Avail: NTIS HC A08

Two types of global climate cycles - the glacial and the greenhouse climates - are discussed in the context of paleoclimatology. Hypotheses are presented which may explain the causes of dramatic periods of cooling in the Earth's history. The application of paleoclimatic data to contemporary climate forecasting is addressed. R.S.F.

N85-15198# Joint Publications Research Service, Arlington, Va.
INTERNATIONAL CONFERENCE ON PHYSICS OF CLOUDS Abstract Only c47
In its USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 4 Transl. into ENGLISH from Kazahstansk. Pravda (Alma-Ata), 29 Aug. 1984 p 3 (For primary document see N85-15196 06-42)
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The study of laws of the origin, growth and spreading of clouds may help realize mankind's ancient dream of modifying the weather and preventing destructive natural disasters. Results of observations and of laboratory and field experiments were shared. Effective and economical ways of controlling the formation of clouds were sought. The successes in a scientific experiment over a large territory for the purpose of protecting farm crops against hail were noted. Important results were obtained in the course of joint studies of precipitation accumulation made by Soviet scientists and their colleagues from other socialist countries in the interest of preventing drought. B.G.

N85-15199# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF TEMPERATURE FIELD BASED ON OBSERVATIONS OF REFRACTION FROM HIGH METEOROLOGICAL MAST Abstract Only c47
S. P. Beschastnov, G. M. Grechko, A. S. Gurvich, S. V. Zagoryuko, V. Kan, and V. V. Finke *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 6 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 231-236 Original language document was announced in IAA as A84-34438 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

Results from temperature field observations performed by a high-altitude meteorological mast are reported. The observations were made by measuring sunlight refractions from an altitude of 290 meters. The data are arranged to form vertical profiles of temperature which are in turn used to study the structure of the temperature field. The profiles are compared with data from observations made by conventional temperature sensors, and are found to be in error by only + or - 0.2 C. I.H.(IAA)

N85-15200# Joint Publications Research Service, Arlington, Va.
MANGANESE IN RECENT SEDIMENTS OF UKRAINIAN SSR BLACK SEA SHELF c48
V. I. Ogorodnikov and K. S. Krasovskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 8-13 refs Transl. into ENGLISH from Dokl. Akad. Nauk Ukr. SSR, Ser. B: Geol., Khim i Biol. Nauki (Kiev), no. 6, Jun. 1984 p 18-21 (For primary document see N85-15196 06-42)
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The geochemistry and distribution of manganese in the sediments of the Black Sea shelf are discussed. The origin of manganese in the Black Sea is considered. The geochemistry of manganese is contrasted with that of iron for the Black Sea region. Areas of intensive manganese accumulations are identified. R.S.F.

N85-15201# Joint Publications Research Service, Arlington, Va.
INTERNAL WAVES IN OCEAN c48
A. D. Yampolskiy, G. Ye. Kononkova, and K. V. Pokazeyev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 13-20 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1984 p 40-44 (For primary document see N85-15196 06-42)
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The phenomenon of internal waves in the world ocean is discussed. Methods of measurement of such waves are given. Surface manifestations of internal waves are considered. The relationship between surface-active substances or slicks and internal waves is discussed. R.S.F.

N85-15202# Joint Publications Research Service, Arlington, Va.
UNSINKABILITY OF FERROMANGANESE NODULES c48
In its USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 28-29 Transl. into ENGLISH from Priroda (Moscow), no. 3, Mar. 1984 p 112-113 (For primary document see N85-15196 06-42)
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A theory is advanced to explain the unsinkable nature of ferromanganese nodules on the world ocean bottom. Such factors as compression of the ocean bottom layers, plastic strength and pressure of the silt, and rate of sediment formation are considered. R.S.F.

N85-15203# Joint Publications Research Service, Arlington, Va.
SHIPBOARD AND SATELLITE-AIDED COMMUNICATIONS EQUIPMENT IN EXHIBITION Abstract Only c32
V. Ryndin *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 42 Transl. into ENGLISH from Sov. Latv. (Riga), 19 Jul 1984 p 4 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

Information is presented on features of Soviet developments that were shown in a exhibition, New Communications Apparatus and Equipment, which opened at the USSR Exhibition of National Economic Achievements in Moscow. Particular attention is devoted to equipment intended for the international KOSPAS-SARSAT system for locating ships and airplanes in distress and for other satellite-aided communications systems. Mention is made also of a shipboard radio set called Angara. It is produced in two variants: the Angara-RBI, which is intended for seagoing vessels, and the Angara RA, which is intended for floating power plants and river vessels of the Meteor and other types. The Angara is described as a compact, fourth-generation radio set with a memory and a microcomputer, which permits the automatic scanning of eight call channels. The power consumption of the Angara is low, and it is capable of transferring automatically to battery power supply if necessary. Author

N85-15204# Joint Publications Research Service, Arlington, Va.
ENERGY ACTIVE AREAS OF OCEAN Abstract Only c48
S. S. Lappo, S. K. Gulev, A. P. Metalnikov, A. P. Rozhdestvenskiy, A. Ye. Sokolov, V. A. Volkova, G. P. Kopeykina, T. N. Reva, Yu. A. Tikhonov, and M. V. Senenov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 49 Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 275, no. 4, Apr. 1984 p 1018-1021 (For primary document see N85-15196 06-42)
Avail: NTIS HC A08

An energy active area in the ocean refers to a region (focus) where the intensity of energy exchange between the atmosphere and the ocean is three to five times greater than the background levels. A general map of the energy active areas of the world ocean is presented, obtained by a method based on analysis of variation between characteristics in the upper layer of the ocean such as water temperature and saturation moisture content in the adjacent layer of the atmosphere over an annual cycle. Calculations were based on mean monthly values of hydrometeorological elements at the points of intersection of a 10 deg grid throughout the ocean. The greatest phase differences in annual temperature fluctuations are characteristic of the tropical energy active area, particular the Malayan Archipelago. Analysis shows that the contribution of the integral heat exchange of long period climatic processes predominates in the equatorial-tropical areas and in the polar regions. In the middle latitudes the location of elevated climatic energy activity is similar to that of the energy active areas in the seasonal cycle. Author

N85-15205# Joint Publications Research Service, Arlington, Va.
SOME METHODOLOGICAL ASPECTS OF STUDY OF LAYER ASSOCIATIONS IN CONTINENTS AND OCEANS Abstract Only c46
G. L. Kirillova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 49-50 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 106-109 (For primary document see N85-15196 06-42)
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Formation analysis is increasingly used in oceanographic studies. Most classifications of oceanic sedimentary formations are based on the types of morphological structures and the conditions of their formation. This leads to the problem of the hierarchy of the subdivision of the formation levels. Most researchers relate systems of deposits making up large geomorphological elements such as shelves, continental slopes and ocean beds to formations. Subformations are smaller units of the underwater relief such as littorals, the shallow and deep shelf. Microformations and facies are still smaller geomorphological elements. Achievements in the geological and geophysical study of the seas and oceans have made it possible to correlate associations of layers of various ranks in the continents and oeans. There are three ranks of layer associations both on the continent and on the ocean floor. The primary unit of seisostratigraphic analysis is the sedimentary system. Lithofacies are elements of sedimentary systems. Sedimentary systems formed at the same time can be combined into tracks or lateral rows of systems. Correlation of geological bodies in transitional zones between continents and oceans is a pressing task of today. Author

N85-15206# Joint Publications Research Service, Arlington, Va.
EARTHQUAKES AND TECTONICS OF PACIFIC OCEAN MARGINS c46
L. M. Balakina *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 53-62 Transl. into ENGLISH from Priroda (Moscow), no. 3, Mar. 1984 p 27-33 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

Island arc-trench systems on the northern and western margins of the Pacific Ocean are discussed in terms of earthquake focal zones and tectonic processes. The spatial distribution of earthquake foci in the Pacific region is addressed. Results of investigations of the focal mechanisms of earthquakes of the island arcs suggest that earthquakes are caused by processes in the zone of contact of mantle regions with different properties with which the focal zone coincides. R.S.F.

N85-15207# Joint Publications Research Service, Arlington, Va.
SOME TRENDS IN THE MODERN EARTH SCIENCES
V. V. Belousov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 63-83 refs Transl. into ENGLISH from Priroda (Moscow), no. 6, Jun. 1984 p 3-17 (For primary document see N85-15196 06-42)
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The theory of plate tectonics is discussed with respect to the history of development of the Earth's crust. The geology and geophysics of the ocean floor are also considered. Limitations of the plate tectonics model are presented. Paleomagnetic measurement is mentioned briefly. R.S.F.

N85-15208# Joint Publications Research Service, Arlington, Va.
THERMAL ENERGY RESOURCES OF THERMAL WATERS IN KAZAKHSTAN c46
V. S. Zhevago and Zh. S. Sydykov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 84-96 refs Transl. into ENGLISH from Vestn. Akad. Nauk Kazakhs. SSR (Alma-Ata), no. 6, Jun. 1984 p 52-56 (For primary document see N85-15196 06-42)
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Thermal waters and thermal anomalies within the USSR are discussed. The potential thermal energy contained in the Soviet geothermal resources is considered along with the utilization of that energy. R.S.F.

N85-15209# Joint Publications Research Service, Arlington, Va.
STATISTICAL RELATIONSHIP OF STRONG EARTHQUAKES WITH PLANETARY GEOMAGNETIC FIELD ACTIVITY Abstract Only c46
M. M. Pogrebnikov, N. I. Komarovski, Yu. A. Kopytenko, and A. P. Pushel *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 97 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 339-340 (For primary document see N85-15196 06-42)
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Earlier studies reported a significant decrease in the geomagnetic field before strong earthquakes. Possible relationships between earthquakes with magnitude greater than 7 (Soviet scale) and planetary terrestrial magnetic field activity as characterized by the K sub p index were investigated. A total of 100 cases of strong earthquakes on magnetically quiet days in 1965 to 1975 were studied. The K sub p indexes were studied for two days before and two days after the earthquakes. The dispersion curve shows a significant decrease one day before each event. The relationship of the planetary K sub p index with seismic activity indicates that the period of preparation for an earthquake and at the moment of the shock are reflected in the terrestrial magnetic field. Author

N85-15210# Joint Publications Research Service, Arlington, Va.
ANOMALOUS MAGNETIC FIELD IN NORTHWESTERN PACIFIC OCEAN AND PACIFIC OCEAN PLATE KINEMATICS Abstract Only c46
A. M. Gorodnitskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 98 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 22-31 (For primary document see N85-15196 06-42)
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Soviet research vessels undertook detailed geomagnetic surveys in the area of the Shatskiy Rise and adjacent northwest trench, with measurement of the total geomagnetic field vector modulus. The results of the surveys were used in compiling a summary map of the anomalous magnetic field for the area studied. Analysis shows that within the area in question there are clear linear magnetic field anomalies with a broad band of negative field values adjacent to the Shatskiy Rise. A model consisting of normal and reverse magnetized blocks in the magnetically active ocean crust layer was calculated for one profile in order to identify linear magnetic anomalies. The data indicate new equatorial

formation of the Shatskiy Rise with subsequent movement to its present 35 deg position. The data indicate that the latitude of its central dome at the time of formation was about -15 deg. Author

N85-15211# Joint Publications Research Service, Arlington, Va.
BOUNDARY VELOCITIES OF MOHOROVICIC DISCONTINUITY AND UPPER MANTLE STRUCTURE OF PACIFIC OCEAN BED Abstract Only c46
N. Ya. Kunin and G. I. Semenova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 99 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 32-37 (For primary document see N85-15196 06-42)
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Published data from deep seismic soundings of the Pacific Ocean bed were reviewed. The values studied were primarily obtained on 40 to 60 km travel-time curves with an average of 7 to 10 points on each travel-time curve and a spacing of 3 to 5 km between points. The results were used to construct a diagram of the distribution of boundary velocities along the M discontinuity and a graph of the distribution of V(m)sub h for various structures as well as the entire ocean bed. Lateral changes in the velocity characteristic of the M discontinuity are found to be significantly greater than changes which might be caused by velocity anisotropies and thus apparently result from variations in tectonic activity over the ocean bed. Lateral inhomogeneities in the upper mantle revealed by the studies are the main indications of differences in the earth down to a depth of 1 or 200 km. The trend toward slight increases in P wave velocity with depth immediately over the M discontinuity in the Pacific Ocean bed is firmly established. The lateral differences in V(m) sub h thus must be considered indications of the depth of mantle complexes which extend to the mantle surface. Author

N85-15212# Joint Publications Research Service, Arlington, Va.
DEEP STRUCTURE OF TERRESTRIAL CRUST AND UPPER MANTLE IN SOUTHEASTERN SIBERIA AND FAR EAST ACCORDING GEOLOGICAL-GEOPHYSICAL DATA Abstract Only c46
L. Ye. Shustova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 99-100 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 46-51 (For primary document see N85-15196 06-42)
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A deep cross section of the crust and upper mantle is constructed along profiles in southeastern Siberia and the Far East, including a combination of geological structures of various stages from the Precambrian eastern Siberian platform to the contemporary zone of transition from the Asian continent to the Pacific Ocean. The length of the profiles totals over 4500 km. The distribution of the normalized gravitational field gradient maxima and minima is used to distinguish six large deep blocks of the crust and upper mantle, each extending for several hundred kilometers along the profile and reaching 500 to 600 km in depth. The sections agree with previous concepts of the geological structure of the region. The depth cross sections presented describe the current and upper mantle along the profile. Author

N85-15213# Joint Publications Research Service, Arlington, Va.
CORRELATION RADIUS OF GRAVITATIONAL AND MAGNETIC ANOMALIES AND METHODS OF ITS DETERMINATION Abstract Only c46
S. A. Serkerov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 100-101 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 285-290 (For primary document see N85-15196 06-42)
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Determination of the correlation radius of gravitational and magnetic anomalies has been accomplished in previous studies. Two of these previous studies are extended and a number of new results leading to improvement of the previously published methods in both two-dimensional and three-dimensional cases is presented. The formulas presented allow determination of the parameter both from anomaly data and in the frequency area based on energy spectrum data. The method is the most complete method yet published for determining the correlation radius, is suitable under all conditions of two-dimensional and three-dimensional cases for both deterministic and random gravitational and magnetic anomalies. Author

N85-15214# Joint Publications Research Service, Arlington, Va.
SELECTION OF SPACING OF MODULAR AND GRADIENT MEASUREMENT SURVEYS BASED ON STATISTICAL CHARACTERISTICS OF MEASURED GEOMAGNETIC FIELD Abstract Only c46
V. G. Boyarskikh, I. G. Zolotov, and Ye. N. Roze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 100-101 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 291-296 Original language document was announced in IAA as A84-31971 (For primary document see N85-15196 06-42)
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An improved method is proposed for determining the correlation radius of gravitational and magnetic anomalies. Formulas are presented which make it possible to determine the correlation radius for alternating-sign magnetic and gravitational anomalies from autocorrelation functions using restricted limits of integration. Expressions are also presented for determining the correlation radius from data on the energy spectra. V.L.(IAA)

N85-15215# Joint Publications Research Service, Arlington, Va.
SPECTRUM OF GEOMAGNETIC FIELD VARIATIONS IN THE RANGE OF PERIODS BETWEEN 1 AND 10 YEARS Abstract Only c46
Yu. R. Rivin *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 101-102 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 269-273 (For primary document see N85-15196 06-42)
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An analysis is presented of the structure of the spectrum of variations in the geomagnetic field F(t) in the range between 1 and 10 years, and the structure is interpreted. The interpretation is based on materials from worldwide observations in 1955-1978, as well as European observations in 1930-1978. There are two harmonics resulting from external causes in the series of observations studied. The two maxima are at 19 and about 41 month intervals. There are no variations which can be related to processes in the liquid portion of the Earth's core, meaning that the minimum period of internal variations at the Earth's surface is about 11 years. R.J.F.

N85-15216# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL EFFECTIVENESS OF AUTOMATED PROCESSING OF HIGHLY PRECISE AEROMAGNETIC SURVEYS IN CASPIAN REGION Abstract Only c43
V. A. Boronayev, L. A. Koval, V. I. Serkov, M. I. Kalinin, and R. G. Komarova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 116 Transl. into ENGLISH from Izv. Akad. Nauk Kazakhsk. SSR: Ser. Geol. (Alma-Ata), no. 3, May - Jun. 1984 p 65-77 (For primary document see N85-15196 06-42)
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The ASOM-AGS/YeS system is intended for the processing and interpretation of data from aerogeophysical surveys on YeS computers. Using this system there can be separate or combined processing of magnetic, gamma-spectral and electrical prospecting data with a topographic tie-in by different methods. A block diagram shows a generalized scheme for processing in the ASOM-AGS/YeS system. A highly precise aeromagnetic survey at 1:50,000 in the area of the Caspian depression and on the Mangyshlak Peninsula with an accuracy to 1 gamma is described. Specific details are given concerning this survey work, both the procedures used and the results obtained. The automated processing of these aerogeophysical data involves four successive stages: initial processing; various operations ensuring thorough qualitative and semiquantitative analysis; quantitative interpretation; and formation of an archives of aerogeophysical and geological data on magnetic tapes, interaction of the system with the computer

archives, geological generalization, and interpretation of the accumulated information. R.J.F.

N85-15217# Joint Publications Research Service, Arlington, Va.
STRESSES AND STRAINS IN LITHOSPHERE CAUSED BY EARTH'S THERMOCONVECTIVE OSCILLATIONS Abstract Only **c46**
B. I. Birger and S. M. Kovtunenko *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 117-118 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (Moscow), no. 3, Mar. 1984 p 3-20 (For primary document see N85-15196 06-42)
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The phenomenon of the earth's thermoconvective instability is described and analyzed by the modeling of a system which is two-layered in its rheological properties. In this model the upper elastic layer (lithosphere) lies on the homogeneous mantle, whose rheological properties conforms to Andrade's creep law. The lithosphere-mantle boundary is defined as an isotherm. Since the temperature changes in the system this is a moving boundary. The regime of threshold convective instability which is observed in the Earth with the adopted evaluations of its physical parameters corresponds to perturbations in the form of nonattenuating thermoconvective waves. The fields of stresses, strains and temperatures in the lithosphere and mantle are determined, as well as the displacements of the earth's surface and the lithospher-e-mantle discontinuity arising during the propagation of a thermo-convective wave. The penetration of convective movements into the lower mantle, where the absence of a superadiabatic temperature gradient is postulated, is also examined. Finally, the influence of denudation and sedimentation processes transpiring at the Earth's surface on convective movements is estimated. R.J.F.

N85-15218# Joint Publications Research Service, Arlington, Va.
CHEMICAL KINETICS AND EARTH'S ATMOSPHERE Abstract Only **c46**
V. L. Talroze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 126 Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 3, Mar. 1984 p 95-105 (For primary document see N85-15196 06-42)
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A review of current knowledge concerning elementary chemical processes transpiring in the atmosphere is given. A table summarizes the stages in development of chemical-kinetic concepts concerning these processes in the three principal layers of the atmosphere. In the ionosphere reactions with the participation of charged particles are most important. In the stratosphere reactions of products of photodissociation processes (free radicals and atoms in ground and excited states) are predominant. In the troposphere the reactions involve unstable molecules with some (but considerably less than in the upper layers) quantity of free radicals and ions. Each of the three layers is examined separately. Experimental methods and research apparatus currently in use are discussed (included are mass spectral methods, electron paramagnetic resonance, laser magnetic resonance, laser resonance, intraresonator laser spectrosocpy and others). R.J.F.

N85-15219# Joint Publications Research Service, Arlington, Va.
PROCESSES OF SMOOTH INCREASE AND DROPOFF IN INTENSITY OF GLOW LINE LAMBDA' = 5577 A WITH EXPOSURE OF IONOSPHERE TO ELECTRON BEAM Abstract Only **c46**
T. G. Adeyshvili and G. G. Managadze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 127 Transl. into ENGLISH from Soobshch. Akad. Nauk Gruzinsk. SSR (Tbilisi), v. 111, no. 1, Jul. 1983 p 61-64 (For primary document see N85-15196 06-42)
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The Stereotop experiment with artificial modification of the Earth's ionosphere with an electron beam was carried out on 1 December 1978 in the middle latitudes under quiet geomagnetic conditions. An electron accelerator carried aboard the rocket ensured the injection of a beam in a pulsed regime with a duration of 0.6 sec and with a period between pulses of 6 sec. With the angle of beam divergence of approximately 3 keV and approximately 0.2 A respectively. A Fotozavr modulation-type photometer was used in the registry of artificial ionospheric glow in the line lambda = 577 A. It was found that with the injection of electrons the glow intensity of the line lambda = 5577 A increases smoothly and attains a maximum 0.7 sec after onset of injection. After cessation of injection there is a dropoff in the intensity of the observed signal. It is concluded that the smooth increase in glow intensity was caused by accumulation of the energy of the excited states N sub 2 (A(3) Sigma u(+)) and O('S) in the course of their existence, whereas the decrease in glow intensity after cessation of injection was caused by the quenching of -0('S) by atomic and molecular oxygen. R.J.F.

N85-15220# Joint Publications Research Service, Arlington, Va.
INVESTIGATING PHASE STRUCTURE OF ELECTROMAGNETIC FIELD IN LOCAL INHOMOGENEITIES BY MODELING METHOD Abstract Only **c32**
A. N. Bukin, A. E. Isayev, and B. G. Denison *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 127-128 Transl. into ENGLISH from Vestn. Leningr. Univ.: Fiz., Khim (Leningrad), no. 4, issue 1, Feb. 1984 p 95-99 (For primary document see N85-15196 06-42)
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It is important to comprehend the influence of local inhomogeneities on the progagation of electromagnetic waves in waveguides in the case of multimodal waveguides in the Ultrahigh Frequency (UHF) range and in the propagation of Ultralow Frequency (ULF) waves in the Earth-ionosphere natural waveguide. Such a study can be made by using physical spatial-temporal modeling of the processes of propagation of waves in the ULF range. A two-plane waveguide for studying the phase structure of an electromagnetic wave in the presence of local inhomogeneities of height and conductivity is discussed. Two types of inhomogeneities were considered: situated on the Earth (on the same surface where the source is situated) and on an opposite surface, simulating the sharp boundary of the ionosphere. Operation of the experimental apparatus is described; the transmitting and receiving antennas were in a fixed position and the inhomogeneous sector moved smoothly along one of the coordinate lines (the distance between the dipoles must exceed the interval in which the field scattered by an obstacle in the direction of the source decreases to a negligible value since only in this case is a direct measurement of the additional phase possible). The study confirmed the spatially restricted nature of the phase perturbations caused by the considered types of inhomogeneities and the distributions of the additional phase made it possible to detect the presence of some criteria indicative of the geometrical parameters of the inhomogeneities. R.J.F.

N85-15221# Joint Publications Research Service, Arlington, Va.
OBSERVATION OF NATURAL NOISE NEAR UPPER HYBRID RESONANCE IN TERRESTRIAL MAGNETOSPHERE BY PROGNOZ-5 SATELLITE Abstract Only **c46**
G. M. Artemyeva, V. P. Grigoryeva, V. N. Ivanov, V. V. Pisareva, A. F. Tarasov, I. F. Feklicheva, and V. I. Shavshina *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 128 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 249-253 (For primary document see N85-15196 06-42)
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Results are presented and analyzed from a study of natural magnetospheric noise near the upper hybrid resonance made using the Prognoz-5 satellite, launched 25 Nov 76 with an orbital period of 95 hours, perigee 500 km, apogee 200,000 km, orbital inclination 65 deg. Natural noise was studied by an apparatus designed to measure long-wave cosmic radial radiation in the 50-1000 KHz band using both a rod and a frame antenna. The results indicate that the dimensions of the plasmasphere are significantly less than those obtained in earlier works, its shape more nearly circular. Electron concentration is also lower than earlier reported. These changes apparently are related to the solar activity cycle. The high-frequency natural noise of the plasmasphere in the polar

diagram of invariant latitude relative to local geomagnetic time reveals a maximum intensity in the morning and evening sectors between invariant latitudes 40 and 62 deg, which may result from the asymmetric distribution of mild particle fluxes in the nighttime plasma layer. R.J.F.

N85-15222# Joint Publications Research Service, Arlington, Va.
DISTRIBUTION OF ELECTRIC FIELD NEAR WESTWARD PROPAGATING BEND IN AURORA Abstract Only c46
V. G. Petrov, T. V. Kozelova, L. L. Lazutin, and Zh.-P. Treyyu *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 129 Transl. into ENGLISH from Geomagetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 232-236 Original language document was announced in IAA as A84-31962 (For primary document see N85-15196 06-42)
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The explosive phase of a magnetic substorm produces an active area which expands in all directions. In its western portion, characteristic strong magnetic field disturbances occur. The active area is surrounded on the west by a bend in the aurora which moves along an arc toward the west. The results of electric field measurements from balloons launched in 1979 into the active area near and within the auroral bend are analyzed. The behavior of the electrojet during passage of the auroral bend was observed. Consideration of characteristic features of the variations in the magnetic field and natural boundaries of the area of intensive precipitation in association with the auroral bend and their repetition rates at various longitudes as the bend moves westward allows a first approximation of a transition from a time representation to a space representation and analysis of data from measurement of the electric field in the system of a nonmoving bend. The major properties of the distribution of the electric field are noted. R.J.F.

N85-15223# Joint Publications Research Service, Arlington, Va.
LONGITUDINAL CURRENT BEFORE WESTWARD PROPAGATING AURORAL BEND Abstract Only c46
T. V. Kozelova and V. B. Lyatskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 129-130 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 228-231 (For primary document see N85-15196 06-42)
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It was shown that at the western and eastern boundaries of an auroral protuberance there are two oppositely directed longitudinal currents. Further studies showed that the western area of the aurora has yet another longitudinal current extending into the ionosphere, explaining the increase observed in the eastern electric field in advance of the auroral area propagating toward the west. The distance of a current extending into the ionosphere to the west of the auroral zone previously observed. This work presents a study of this additional was longitudinal current to the west of the visible auroral area. The current, a clockwise-rotating vortex of equivalent ionospheric currens, encompasses the area of positive divergence of horizonal magnetic and electric field vectors. Two independent methods were used to determine the magnitude of the currents, both of which yielded approximately the same results. The current density entering the ionosphere is about 0.5 A/square Km, total current from 10,000 to 100,000 A. R.J.F.

N85-15224# Joint Publications Research Service, Arlington, Va.
NATURE OF SHORT-PERIOD VARIATIONS OF COSMIC RAYS IN STRATOSPHERE Abstract Only c93
Yu. I. Barannikov, O. A. Barsukov, and P. F. Gavrilov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 132 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 299-300 Original language document was announced in IAA as A84-31974 (For primary document see N85-15196 06-42)
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An explanation is offered for short-period variations of cosmic-ray intensity in the stratosphere with an amplitude of about 10 percent. It is suggested that, at low and middle latitudes, these variations can be explained by wave motions of air in the atmosphere; and that, at high latitudes, they can be explained by pulsating precipitations of trapped radiation, induced by resonant oscillations of the outer field lines of the magnetosphere.
B.J. (IAA)

N85-15225# Joint Publications Research Service, Arlington, Va.
MECHANISM OF DAMPING OF PLASMA OSCILLATIONS IN INITIAL STAGE OF INJECTION OF ELECTRON BEAMS FROM SPACECRAFT INTO IONOSPHERE IN ACTIVE EXPERIMENTS Abstract Only c75
V. A. Fedorov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 134 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 205-210 (For primary document see N85-15196 06-42)
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A suggested mechanism of damping of plasma ocillations in the initial inection stage of electron beams from a spacecraft into the ionosphere was studied and the characteristics of the parameters used in actual experiments were calculated. The interaction of the variable electric field with the plasma electrons which create the neutralization current, explains the suggested mechanism damping of plasma oscillations in the initial stage of injection of electron beams and the dynamics of unsteady processes related to changes in the electric potential of the spacecraft and the parameters of the ionospheric plasma. The mechanism of damping of plasma ocillations is confirmed by a numerical model of the neutralization process of the spacecraft charge in actual experiments. It is concluded that it is possible to pump plasma oscillations in the initial stage of injection of electron beams in active experiments in the ionosphere if the experimental criteria are satisfactorily met. E.A.K.

N85-15226# Joint Publications Research Service, Arlington, Va.
SIMPLE FORMULA TO ESTIMATE CARBON DIOXIDE GAS EFFECT IN RADIATION BALANCE OF UNDERLYING SURFACE Abstract Only c47
Zh. K. Zolotova and K. S. Shifrin *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 134-135 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 321-323 (For primary document see N85-15196 06-42)
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Simple radiation models were selected for estimation of the role of CO2 in the radiation balance of the Earth's surface. A simple equation was derived which allows approximate calculation of E. This equation estimates the direct contribution of carbon dioxide gas to the counter-radiation of the atmosphere and the significance of other factors in the phenomenon. In the 12.5 to 18.5 micron band the contribution of CO2 varies from 35% in very dry air to 8% in very humid air. Counter radiation is also quite dependent on air temperature, less on moisture content, still less on CO2 content. E.A.K.

N85-15227# Joint Publications Research Service, Arlington, Va.
SOLAR WIND DYNAMICS AT SMALL DISTANCES FROM THE SUN Abstract Only c92
N. A. Lotova and D. F. Blums *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 135 Transl. into ENGLISH from Geomagetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 182-186 Original language document was announced in IAA as A84-31952 (For primary document see N85-15196 06-42)
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The dynamics of the solar wind at distances from the Sun that are less than or approximately equal to 30 solar radii was investigated using the scintillation method. It is found that a change in the level of solar activity produces a change in the location of the region where the transition from the subsonic flow of circumsolar plasma to the supersonic solar wind flow occurs. The dynamics of the subsonic/supersonic transition is examined.
V.L. (IAA)

N85-15228# Joint Publications Research Service, Arlington, Va.
POSSIBLE EFFECTS OF INTERACTION OF ELECTRIC SEISMIC

FIELDS WITH THE IONOSPHERE Abstract Only c46
M. B. Gokhberg, N. I. Gershenzon, I. L. Gufeld, A. V. Kustov, and V. A. Liperovskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 136 Transl. into ENGLISH from Geomagetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 217-222 Original language document was announced in IAA as A84-31959 (For primary document see N85-15196 06-42)
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Increases in electron density were observed in the E and F layers of the ionosphere over the epicenters of major earthquakes during the period immediately preceding the earthquake. The formation of the sporadic E layer was also observed. The effects are attributed to the excitation of electric fields of seismic origin in the ionosphere. A possible scenario for the development of turbulent strata in the ionosphere is proposed. V.L. (IAA)

N85-15229# Joint Publications Research Service, Arlington, Va.
LIDAR MEASUREMENTS OF STRUCTURAL CHARACTERISTICS OF ATMOSPHERIC TURBULENCE Abstract Only c47
M. S. Belenkiy, A. A. Makarov, V. L. Mironov, and V. V. Pokasov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 137 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, apr. 1984 p 314-317 Original language document was announced in IAA as A84-34448 (For primary document see N85-15196 06-42)
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Remote optical methods for determining the structural characteristic of refractive index fluctuations are essential in real time measurements of the height dependence of the refraction index and in predicting the effect of atmospheric turbulence on the performance of laser systems. The lidar method based on the scattering of light by natural atmospheric aersols provides a way to obtain, in real time, information on the spatial temporal distribution of the above parameter. Results of an experimental verification of the lidar method at near Earth paths are examined. V.L. (IAA)

N85-15230# Joint Publications Research Service, Arlington, Va.
DIURNAL VARIATION HARMONICS AND SPATIAL CHANGE IN COSMIC RAY FLUX Abstract Only c93
Yu. P. Melnikov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 137 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 297-298 (For primary document see N85-15196 06-42)
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Conditions of cosmic ray propagation in interplanetary space were used to obtain precise equations for the relative values of diurnal variation harmonics. Equations are derived for the harmonics of diurnal variations and it is assumed that the recorders used for measurement receive radiation in the solar equatorial plane. Experimental data are used for directions close to the solar equatorial plane. The formulas allow more detailed study of the mechanism of the second harmonic of magnetized particles. Harmonics through the fourth are calculated. E.A.K.

N85-15231# Joint Publications Research Service, Arlington, Va.
ELECTRIC FIELD IN PLASMA LAYER OF MAGNETOSPHERE DURING PRELIMINARY SUBSTORM PHASE Abstract Only c75
V. A. Sergeyev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 138 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 237-241 (For primary document see N85-15196 06-42)
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An analysis of data measured by the IMP-8 satellite on the magnetic field and energetic photon fluxes in the plane of the ecliptic is discussed. It verified that plasma is not accumulated in the central portion of the plasma layer, and it is estimated that the maximum possible influence of the desired convection rate component is based on measurements of mass fluxes in the plane of the ecliptic. Measurements from the central portion of the layer are very valuable in this finding. The assumption of equilibrium status of force tubes within the plasma layer is confirmed. E.A.K.

N85-15232# Joint Publications Research Service, Arlington, Va.
FINE STRUCTURE OF ALFVEN MASER RADIATION Abstract Only c46
P. P. Belyayev, S. V. Polyakov, V. O. Rapoport, and V. Yu. Trakhtengerts *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 138 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 242-248 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

The magnetosphere of the Earth is represented as an Alfven maser. Various modes of generation were detected in Alfven masers. Instability in an Alfven maser results from cyclotron instability, which are a result of transverse anisotropy in captured energetic particles. A theoretical model is constructed of the generation of complex dynamic geomagnetic pulsations by the terrestrial magnetosphere. Quantitative estimates for radiation belt proton energy and precipitating particle energy density are produced. E.A.K.

N85-15233# Joint Publications Research Service, Arlington, Va.
REPULSIVE FORCE OF MAGNETIC CLOUDS DURING SOLAR FLARES AND MAGNETOSPHERIC SUBSTORMS Abstract Only c92
K. G. Ivanov and A. F. Kharshiladze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 139 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 177-181 Original language document was announced in IAA as A84-31951 (For primary document see N85-15196 06-42)
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A precise analytical solution is sought to the forces of repulsion for a variety of magnetic clouds, particularly for flattened ellipsoids of revolution with long axis in the direction of the repulsive force. The force acting on a flattened ellipsoid of revolution of this type is analyzed and the solution found for the repulsive force. Application of this solution in estimates of the repulsive force of magnetic clouds in interplanetary space during solar flares and magnetospheric substorms is discussed. Author

N85-15234# Joint Publications Research Service, Arlington, Va.
LIMITS OF APPLICABILITY OF LONG WAVE THEORY IN STUDIES OF OSCILLATIONS OF n-LAYER FLUID Abstract Only c46
M. V. Babiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 140 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 329-332 (For primary document see N85-15196 06-42)
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In solving problems on the oscillations of an n-layer fluid, it is important to know the limits of applicability of the assumptions of the theory of long waves. A criterion is presented which can be used to determine whether the vertical acceleration can be ignored in an n-layer fluid. Conditions are determined which must be satisfied by the thickness of the layers and changes of density between them. The equations derived can be applied in studies of the generation and propagation of long waves in n-layer stratified liquids using the approximation of long wave theory. Author

N85-15235# Joint Publications Research Service, Arlington, Va.
CHARACTERISTIC SCALE OF INNER MIXING LAYERS IN STABLY STRATIFIED ATMOSPHERE Abstract Only c46
M. V. Kurganskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 140 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 237-241 (For primary document see N85-15196 06-42)
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The most accurate estimate of turbulence in a stable stratified natural atmosphere can be obtained by considering the power relationships and the rate of expenditure of kinetic energy on turbulent mixing. The major isothermal status of the atmosphere is studied. The effect of turbulent mixing is one primarily of equalizing the average potential temperature field heterogeneities. The numerical estimate is calculated assuming that turbulence is

maintained by the reserves of kinetic energy in the atmosphere generated in general circulation processes. It is found that the equilibrium thickness of internal mixing layers is approximately 16 meters. The results obtained are compared with those yielded by similarity theory for a stratified boundary layer. Author

N85-15236# Joint Publications Research Service, Arlington, Va.
INTERNAL GRAVITY WAVES IN REAL ATMOSPHERE Abstract Only c46
O. V. Kaydalov and t. V. Solovyeva *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 141 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 255-261 (For primary document see N85-15196 06-42)
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A numerical model of internal gravity waves, a modification of an earlier model to study fluctuations in a spherical rotating atmosphere was studied. The modified model can be used to study internal gravity waves in an atmosphere with temperature and wind stratification close to that observed in the real atmosphere. The work was intended to study resonance properties of the atmosphere with respect to internal gravity waves with phase velocities of over 100 m/s. The results of numerical modeling also allow estimation of the power of the assumed sources of the resonance waves. Author

N85-15237# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF REFRACTION EFFECTS ON INFORMATIVENESS OF BISTATIC ACOUSTICAL ATMOSPHERIC SOUNDING SYSTEMS Abstract Only c46
A. Ya. Bogushevich and N. P. Krasnenko *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 141 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 262-268 Original language document was announced in IAA as A84-34443 (For primary document see N85-15196 06-42)
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The influence of regular refraction on the angle and time of arrival of a signal is studied for a bistatic sounding system in order to produce equations relating these parameters to wind speed and temperature profiles. The method of geometric acoustics is used, since the wavelength of the sound radiation is short in comparison to the characteristic dimensions of regular atmospheric heterogeneities. Meteorological fields are assumed to be steady and horizontally homogeneous in the scale of measurements characteristic for acoustic soundings. It is found that measurement of the angle and time of arrival of a signal in bistatic sounding can be used to obtain information on the profiles of V sub x, V sub y and T. Equations are presented which can in the first approximation represent refraction effects which, if ignored, might yield an unacceptably large error. Author

N85-15238# Joint Publications Research Service, Arlington, Va.
LONG-DISTANCE PROPAGATION OF INFRASOUND IN ATMOSPHERE NEAR EARTH'S SURFACE Abstract Only c71
G. A. Grachev, A. I. Bush, S. N. Kulichkov, A. K. Matveyev, and M. I. Mordukhovich *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 142 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 309-311 Original language document was announced in IAA as A84-34446 (For primary document see N85-15196 06-42)
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An experimental explosion with an energy of 1.1 x 10 to the 12th power J, a part of an experimental program for modeling magnetic-atmospheric coupling during seismic phenomena, was audible at a distance of up to 200 km from the source. This long-distance propagation of sound resulted from formation of an acoustical waveguide due to a temperature inversion. Since the possibility of this type of long-distance sound propagation at low altitudes had not previously been experimentally confirmed, this work presents some results of observations of long-distance sound propagation within an acoustical waveguide in the boundary layer next to the Earth during the experimental magnetospheric modeling program. The blast was set off at 8:31 local time in a plains area in Alma-Ata Oblast. Wave modes which can most effectively propagate through the natural waveguide are calculated. Attenuation is found to vary approximately inversely with distance as in experimental waveguides. Author

N85-15239# Joint Publications Research Service, Arlington, Va.
STUDY OF LOW-FREQUENCY SOUND WITH POINT SOURCE IN STREAM WITH SHEAR Abstract Only c71
V. P. Goncharov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 142 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 312-314 Original language document was announced in IAA as A84-34447 (For primary document see N85-15196 06-42)
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The three-dimensional structure of acoustical atmospheric oscillations produced by a point radiator when wind stratification typical for the boundary layer was studied. For sufficiently low-frequency radiators, such that geometric acoustics cannot be used, the horizontal field structure in the plane of the source can be calculated. In particular the rate of attenuation of field amplitude at very great distances can be computed in terms of the external scale of the problem. The problem is solved assuming a barotropic medium of homogeneous density over a horizontal side surface and a point source of radiation. Author

N85-15240# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF IONIZATION SOURCES IN D REGION BASED ON THEORETICAL MODELS Abstract Only c46
M. N. Vlasov and V. V. Medvedev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 143 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 187-190 Original language document was announced in IAA as A84-31953 (For primary document see N85-15196 06-42)
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The ionizing agents of the D region are analyzed using a numerical model where the spatial-temporal distribution of the neutral and ion composition of the mesosphere and lower thermoshere is computed for given height profiles of the turbulent diffusion coefficient, molecular nitrogen, and temperature of the neutral atmosphere. The model employs one-dimensional equations for a weakly ionized plasma. It is shown that the relative importance of ionization sources in the D region is largely determined by the season and the time of day. V.L.(IAA)

N85-15241# Joint Publications Research Service, Arlington, Va.
MEDIUM- AND LARGE-SCALE WAVE DISTURBANCES AND HETEROGENEITIES OF ELECTRON CONCENTRATION IN OUTER IONOSPHERE IN MIDDLE AND LOW LATITUDES Abstract Only c46
M. N. Fatkullin, G. K. Solodovnikov, and A. D. Legenka *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 143 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 191-195 Original language document was announced in IAA as A84-31954 (For primary document see N85-15196 06-42)
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Results are presented from studies of medium- and large-scale heterogeneities in electron concentration m(sub e) for typical heliophysical and geophysical situations by means of capturing a large interval of altitudes in the outer ionosphere with sharply varying physical conditions and analysis of high solar activity conditions in the middle and low latitudes. Data from the Alouette-2 satellite were used. Energy spectra and mutual correlation of fluctuations of m (sub e) at different altitudes are studied. B.G.

N85-15242# Joint Publications Research Service, Arlington, Va.
MODELING INFLUENCE OF THREE LAYER CLOUD COVER ON OUTGOING THERMAL RADIATION Abstract Only c46
I. M. Gracheva and I. I. Mokhov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 144 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow),

v. 20, no. 4, Apr. 1984 p 242-249 Original language document was announced in IAA as A84-34440 (For primary document see N85-15196 06-42)
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A small-parameter model of three-layer cloud cover is used to study the sensitivity of fluxes of outgoing thermal radiation to changes in cloud amount. The redistribution of clouds at different levels is taken into account by using seasonal data on cloud cover in the Northern Hemisphere at 10, 40, 60, and 80 deg. N, and the influence of opacity of high clouds on thermal flux is calculated. A comparison of calculations for three-layer cloud cover and for a single effective cloud layer at different heights is performed, and it is found that the predicted thermal flux values for three-layer cloud cover differ considerably from those calculated for single-layer ones. I.H.(IAA)

N85-15243# Joint Publications Research Service, Arlington, Va.
ACTUAL ALTITUDES OF RADIOACOUSTIC SOUNDING IN DECIMETER WAVELENGTH BAND Abstract Only c71
V. D. Belyavskaya, M. A. Kallistratova, G. A. Karyukin, and I. V. Petenko *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 145 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 250-254 (For primary document see N85-15196 06-42)
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An expression for the signal-to-noise ratio was achieved in radioacoustic soundings allowing estimation of the maximum sounding altitude under actual conditions, considering mean wind speed and antenna location. Under actual characteristic conditions the primary contribution to decreasing the useful signal and thus descreasing H(sub max) is that of displacement of the center of the spot of mirror-reflected radiation from the aperture of the receiving antenna, disrupting the conditions of synphase addition of scattered waves in the reception area. By assigning the minimum necessary signal-to-noise ratio for adequate signal processing, the equation can be used to calculate the theoretical variation of H(sub max) as a function of transverse wind speed for a specific radiosounding system. Theoretical results obtained in this manner are compared with experimental data obtained with a decimeter waveband system, yielding good results. Author

N85-15244# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF RADAR TO MEASURE SEA ICE MERITS PRIZE NOMINATION Abstract Only c32
Yu. Kobzarev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 147 Transl. into ENGLISH from Izv. (Moscow), 1 Sep. 1984 p 3 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

Research began with sea ice, for which field experiments were conducted to determine the optimum shape of the sounding signal. An original method was proposed which makes it possible to overcome the contradiction between the permissible value of radio-wave attenuation in sea ice and the possibility of distinguishing the [top and bottom] surfaces of ice cover separately. Onboard aircraft apparatus which was developed has begun to be used extensively for ice reconnaissance in various regions of the Arctic and on inland bodies of water of our country. The schematic concept for the method of receiving and processing signals was worked out, and an aircraft instrument for remote measurement of the thickness of sea ice was developed. The new remote measuring method was developed into ice reconnaissance and aerial surveying for ice-measurement purposes. B.G.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N85-15245 Department of the Air Force, Washington, D.C.
PHOTO-RECONNAISSANCE SYSTEM Patent
J. E. Verdier, inventor (to Air Force) Issued 10 Apr. 1984 6 p Supersedes AD-D009887
(AD-D011287; US-Patent-4,442,453; US-Patent-Appl-SN-347383; US-Patent-Class-358-109) Avail: US Patent and Trademark Office CSCL 14/5

A photo-reconnaissance system is disclosed in which the landscape is photographed on film. The film is then developed and scanned by electro-optical sensors. The output signal from the E-O sensors is transmitted to a ground station where it is demultiplexed and displayed on a plurality of television type monitors. An operator can view the reconnaissance scene in near-real time and transmit commands back to the airborne station directing a change in flight course or a magnification of a particular target. A permanent record of the reconnaissance scene can be obtained either from the on-board film or by making a print from the television type monitors. GRA

N85-15246*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
CLASSIFICATION OF VEGETATION COMMUNITIES IN THE BATTLE MOUNTAIN SE QUADRANGLE, NEVADA WITH MSS DIGITAL DATA
Merrill K. Ridd, R. Douglas Ramsey, Gordon E. Douglass, and John A. Merola Dec. 1984 50 p Sponsored in part by Army Engineer Topographic Labs. Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Grant NAGw-95)
(E85-10043; NASA-CR-174220; NAS 1.26:174220; CRSC-84-7) Avail: NTIS HC A03/MF A01 CSCL 05B

LANDSAT MSS digital data were utilized to identify vegetation types in an area of Battle Mountain SE in northern Nevada. Ways in which terrain data may improve spectral classification were investigated. The basic data set was a CCT of LANDSAT scene 82233617450, dated 15 June 1981. Seventeen ecotypic classifications were identified in the study area on the basis of field investigations. The percent cover by life form and non-living material for the 17 classes is summarized along with the percent cover by species for the 17 classes. R.S.F.

N85-15247*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EXPERIENCES WITH DIGITAL PROCESSING OF IMAGES AT INPE [EXPERIENCIAS COM PROCESSAMENTO DIGITAL DE IMAGENS NO INPE]
Nelson D. A. Mascarenhas, Principal Investigator Oct. 1984 20 p refs In PORTUGUESE; ENGLISH summary Presented at Seminario Sobre Processamento de Sinais e Tratamento de Inform., Rio de Janeiro, 16 Oct. 1984 Sponsored by NASA ERTS
(E85-10045; NASA-CR-174189; NAS 1.26:174189; INPE-3293-PRE/608) Avail: NTIS HC A02/MF A01 CSCL 09B

Four different research experiments with digital image processing at INPE will be described: (1) edge detection by hypothesis testing; (2) image interpolation by finite impulse response filters; (3) spatial feature extraction methods in multispectral classification; and (4) translational image registration by sequential tests of hypotheses. Author

N85-15248*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
AN INTEGRATED LANDSAT/ANCILLARY DATA CLASSIFICATION OF DESERT RANGELAND
Kevin P. Price, Merrill K. Ridd, and John A. Merola [1984] 8 p Sponsored in part by Utah Dept. of Agriculture ERTS
(Grant NAGw-95)
(E85-10046; NASA-CR-174222; NAS 1.26:174222) Avail: NTIS HC A02/MF A01 CSCL 08B

Range inventorying methods using LANDSAT MSS data, coupled with ancillary data were examined. The study area

encompassed nearly 20,000 acres in Rush Valley, Utah. The vegetation is predominately desert shrub and annual grasses, with some annual forbs. Three LANDSAT scenes were evaluated using a Kauth-Thomas brightness/greenness data transformation (May, June, and August dates). The data was classified using a four-band maximum-likelihood classifier. A print map was taken into the field to determine the relationship between print symbols and vegetation. It was determined that classification confusion could be greatly reduced by incorporating geomorphic units and soil texture (coarse vs fine) into the classification. Spectral data, geomorphic units, and soil texture were combined in a GIS format to produce a final vegetation map identifying 12 vegetation types. Author

N85-15249*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
A GEOGRAPHIC INFORMATION SYSTEM FOR RESOURCE MANAGERS BASED ON MULTI-LEVEL REMOTE SENSING DATA
Douglas J. Wheeler and Merrill K. Ridd [1984] 10 p Sponsored in part by Utah Dept. of Agriculture ERTS
(Grant NAGw-95)
(E85-10047; NASA-CR-174223; NAS 1.26:174223) Avail: NTIS HC A02/MF A01 CSCL 05B

Procedures followed in developing a test case geographic information system derived primarily from remotely sensed data for the North Cache Soil Conservation District (SCD) in northern Utah are outlined. The North Cache SCD faces serious problems regarding water allocation, flood and geologic hazards, urban encroachment into prime farmland, soil erosion, and wildlife habitat. Four fundamental data planes were initially entered into the geo-referenced data base: (1) land use/land cover information for the agricultural and built-up areas of the valley obtained from various forms of aerial photography; (2) vegetation/land cover in mountains classified digitally from LANDSAT; (3) geomorphic terrain units derived from aerial photography and soil maps; and (4) digital terrain maps obtained from DMA digital data. The land use/vegetation/land cover information from manual photographic and LANDSAT interpretation were joined digitally into a single data plane with an integrated legend, and segmented into quadrangle units. These were merged with the digitized geomorphic units and the digital terrain data using a Prime 400 minicomputer. All data planes were geo-referenced to a UTM coordinate grid. Author

N85-15250*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
EFFECTIVE USE OF REMOTE SENSING PRODUCTS IN LITIGATION
Richard A. Jaynes [1983] 10 p refs ERTS
(Grant NAGw-95)
(E85-10048; NASA-CR-174224; NAS 1.26:174224) Avail: NTIS HC A02/MF A01 CSCL 05D

A boiled-down version of major legal principles affecting the admissibility of data and products from remote sensing devices is presented. It is suggested that enhancements or classifications of digital data (from scanning devices or from digitized aerial photography) be proffered as evidence in a fashion similar to the manner in which maps from photogrammetric techniques are introduced as evidence. Every effort should be made to illucidate the processes by which digital data are analytically treated or manipulated. Remote sensing expert witnesses should be practiced in providing concise and clear explanations of both data and methods. Special emphasis should be placed on being prepared to provide a detailed accounting of steps taken to calibrate and verify spectral characteristics with ground truth. Author

N85-15251*# Technicolor Government Services, Inc., Moffett Field, Calif.
MULTI CROP AREA ESTIMATION IN IDAHO USING EDITOR
E. J. Sheffner Dec. 1984 37 p refs ERTS
(Contract NAS2-11101)
(E85-10054; NASA-CR-177327; NAS 1.26:177327) Avail: NTIS HC A03/MF A01 CSCL 06C

The use of LANDSAT multispectral scanner digital data for multi-crop acreage estimation in the central Snake River Plain of Idaho was examined. Two acquisitions of LANDSAT data covering ground sample units selected from a U.S. Department of Agriculture sampling frame in a four country study site were used to train a maximum likelihood classifier which, subsequently, classified all picture elements in the study site. Acreage estimates for six major crops, by county and for the four counties combined, were generated from the classification using the Battesse-Fuller model for estimation by regression in small areas. Results from the regression analysis were compared to those obtained by direct expansion of the ground data. Using the LANDSAT data significantly decreased the errors associated with the estimates for the three largest acreage crops. The late date of the second LANDSAT acquisition may have contributed to the poor results for three summer crops. Author

N85-15252# Institute of Hydrology, Wallingford (England).
EDDY CORRELATION MEASUREMENTS OF ENERGY PARTITION FOR AMAZONIAN FOREST
W. James Shuttleworth, John H. C. Gash, Colin R. Lloyd, Christopher J. Moore, John Roberts, Ari deO. MarquesFilho, Gilberto Fisch, Vincente dePaula SilvaFilho, Maria deNazare GoesRibeiro, and Luiz C. B. Molion Jul. 1984 46 p refs Submitted for publication Sponsored in cooperation with the Natural Environmental Research Council, the Conselho Nacional de Desenvolvimento Cientifico and Tecnologico and the British Council
(ISPE-3195-PRE/559) Avail: NTIS HC A03/MF A01

Measurements of energy partition for the Amazon rain forest made with eddy correlation equipment are presented for eight dry days in September 1983. These data were interpreted to provide estimates of the aerodynamic and surface resistance for this vegetation type. Daily total evaporation for a transpiring canopy accounts for 70 percent of the available radiant energy, and two thirds of the conventional estimates of potential evaporation. The results were used to provide an initial calibration of a simple, physically based model of daily evaporation for the Amazon rain forest. Author

N85-15253# American Univ., Washington, D. C. Foreign Area Studies.
AREA HANDBOOK SERIES. HONDURAS: A COUNTRY STUDY
J. D. Rudolph Sep. 1983 321 p Supersedes AD-724561
(AD-A146510; DA-PAM-550-151) Avail: NTIS HC A14/MF A01 CSCL 05/2

A compilation of basic facts is given about the social, economic, political and military institutions of various countries. The emphasis is an objective description of the nation's present society and the kinds of possible or probable changes that might be expected in the future. Honduras: A Country Study is an attempt to treat in a compact and objective manner the dominant social, political, economic, and national security aspects of contemporary Honduran society. Sources of information included scholarly journals and monographs, official reports of governments and international organizations, foreign and domestic newspapers, periodicals, and interviews with individuals who have special competence in Honduran and Central American affairs. GRA

N85-15254# Naval Research Lab., Washington, D. C.
A BRIEF INVESTIGATION INTO THE VALIDITY OF SEASAT RADAR ALTIMETER DATA ACQUIRED OVER LAND
D. M. Horan and L. W. Choy 26 Sep. 1984 27 p
(W05-270-S; R14-52-SB)
(AD-A146560; AD-E000602; NRL-MR-5419) Avail: NTIS HC A03/MF A01 CSCL 17/9

The SEASAT 1 satellite, which was launched in 1978, carried a radar altimeter which was optimized for operation over the open ocean. However, the instrument did make a significant number of measurements while over land. It is conclusively demonstrated that the radar altimeter serendipitously made measurements over relatively flat terrain which can provide accurate ground elevations. In addition, it is possible that the instrument had some capability

to distinguish ground features such as canals, elevated roads, and power lines. GRA

N85-15255# SRI International Corp., Menlo Park, Calif.
COMPUTER VISION RESEARCH AND ITS APPLICATIONS TO AUTOMATED CARTOGRAPHY Semiannual Technical Report, 11 Jun. 1983 - 10 Jun. 1984
M. A. Fischler Sep. 1984 135 p
(Contract MDA903-83-C-0027; DARPA Order 3862; DA Proj. 3D3-0)
(AD-A146668; SATR-2/3) Avail: NTIS HC A07/MF A01 CSCL 08/2

The SRI Image Understanding program is a broad effort spanning the entire range of machine vision research. Its three major concerns are: (1) to develop an understanding of the physics and mathematics of the vision process, (2) to develop a knowledge-based framework for integrating and reasoning about sensed (imaged) data, and (3) to develop a machine-based environment for effective experimentation, demonstration, and evaluation of our theoretical results, as well as providing a vehicle for technology transfer. This report describes recent progress in all three areas. In particular, we have shown that fractal functions are an effective tool for representing natural shapes and provide a good basis for recovering 3-D shape from the shading and texture in a single image. For scenes containing man-made objects, we have found ways of using straight edges to recover the 3-D orientation of surfaces from a single view, and reason about the shape of an object from partial information in multiple views. We have built a new and powerful LISP-machine-based environment for use in image understanding research, and are putting together high-performance systems for stereo compilation, feature extraction, and linear delineation. GRA

N85-15256# Royal Aircraft Establishment, Farnborough (England).
INDIVIDUAL GEOPOTENTIAL COEFFICIENTS OF ORDER 15 AND 30, FROM RESONANT SATELLITE ORBITS
D. G. King-Hele and D. M. C. Walker Feb. 1984 34 p
(AD-A146687; RAE-TR-84021; DRIC-BR-92558) Avail: NTIS HC A03/MF A01 CSCL 08/5

The analysis of variations in satellite orbits when they pass through 15th-order resonance (15 revolutions per day) yields values of lumped geopotential harmonics of order 15, and sometimes of order 30. The 15th-order lumped harmonics obtained from 24 such analyses over a wide range of orbital inclinations are used here to determine individual harmonic coefficients of order 15 and degree 15, 16,...35; and the 30th-order lumped harmonics (from eight of the analyses) are used to evaluate individual coefficients of order 30 and degree 30, 32,...40. The new values should be more accurate than any previously obtained. The accuracy of the 15th-order coefficients of degree 15, 16,...23 is equivalent to 1 cm in geoid height, while the 30th-order coefficients of degree 30, 32 and 34 are determined with an accuracy which is equivalent to better than 2 cm in geoid height. The results are used to assess the accuracy of the Goddard Earth Model 10B. Author (GRA)

N85-15257# Utah Geological and Mineralogical Survey, Salt Lake City.
GEOTHERMAL ASSESSMENT OF A PORTION OF THE ESCALANTE VALLEY, UTAH
Robert H. Klauk and Chad Gourley Dec. 1983 59 p refs
(Contract DE-AS07-77ET-28393)
(DE84-015964; DOE/ET-28393/T2) Avail: NTIS HC A04/MF A01

In February 1981, the Utah Geological and Mineral Survey (UGMS) contracted with the Department of Energy (DOE) to evaluate the geothermal potential of an area proposed for a possible Missile Experimental (MX) operations base in the Escalante Valley region of Utah. Exploration techniques employed included a temperature survey, chemical analysis of springs and wells, and temperature-depth measurements in holes of opportunity. The highest water temperatures recorded in the area, with the exceptions of a 60 C (140 F) geothermal exploration hole and Thermo Hot Springs (42 to 78 C or 108 to 172 F), were 27 and 28 C (81 and 82 F) at two wells located northwest of Zane, Utah. DOE

N85-15258# Colorado State Univ., Fort Collins. Water Resources Research Inst.
EFFECT OF LITHOLOGY AND CLIMATE ON THE MORPHOLOGY OF DRAINAGE BASINS IN NORTHWESTERN COLORADO
S. L. Eccker Jun. 1984 157 p refs
(Contracts DI-14-34-0001-1106; DI-14-34-0001-2106)
(PB84-228238; Completion-131; OWRT-A-047-Colo(1)) Avail: NTIS HC A08/MF A01 CSCL 08H

Mining and reclamation have had an impact on drainage-basin morphology. However, if mine operators can predict their effects on drainage development for a given lithology and climate, they can better design a stable post-mining watershed. The effects of changes in topography and vegetative cover can be evaluated by determining existing morphometric relationships for unimpacted drainage basins. Fourteen headwater drainage basins in northwestern Colorado were chosen from three lithologies: the Mesa Verde Sandstone (5); the Browns Park Sandstone (4); and the Mancos Shale (5). For each lithology, the basins span a range of climate. As climate becomes cooler and more moist, vegetative density increases. The greater surface resistance inhibits channel formation and elongation. Author (GRA)

N85-15216# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL EFFECTIVENESS OF AUTOMATED PROCESSING OF HIGHLY PRECISE AEROMAGNETIC SURVEYS IN CASPIAN REGION Abstract Only
V. A. Boronayev, L. A. Koval, V. I. Serkov, M. I. Kalinin, and R. G. Komarova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 116 Transl. into ENGLISH from Izv. Akad. Nauk Kazakhsk. SSR: Ser. Geol. (Alma-Ata), no. 3, May - Jun. 1984 p 65-77 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15645*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SEARCHING FOR IMPACT CRATERS USING SPACE SHUTTLE PHOTOGRAPHY Abstract only
C. A. Wood, C. Dailey (Lockheed Engineering and Management Services Co., Houston, Tex.), W. Daley (Lockheed Engineering and Management Services Co., Houston, Tex.), and G. Wells (Lockheed Engineering and Management Services Co., Houston, Tex.) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p ref (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 08E

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N85-15259*# Westinghouse Research and Development Center, Pittsburgh, Pa.
DEVELOPMENT OF HIGH-EFFICIENCY SOLAR CELLS ON SILICON WEB Quarterly Progress Report, 20 Apr. - 15 Jul. 1984
A. Rohatgi, D. L. Meier, R. B. Campbell, and P. Bai-Choudhury 9 Aug. 1984 23 p refs
(Contract NAS7-100)
(NASA-CR-174212; DOE/JPL-956786-84/1; NAS 1.26:174212;

DE85-001383; QPR-1) Avail: NTIS HC A02/MF A01 CSCL 10A

The major objective of the work reported is to improve web base material with a goal toward obtaining solar cell efficiencies in excess of 18% (AM1). The program consists of the investigation of carrier loss mechanisms in web silicon, development of techniques to reduce carrier recombination in web, and web cell fabrication using effective surface passivation. Web surfaces have been bevelled with the intention of measuring the electrical activity of the twin plane. Web crystals have been intentionally contaminated with vanadium and titanium to examine the twin-plane-assisted internal gettering by DLTS. Model calculations were done to see the effect of twin-plane activity on V/sub oc/ as a function of resistivity of the web material. Experiments were initiated to study the effect of heat treatment and gettering on the minority carrier diffusion length in webs. Fabrication of high-efficiency web cells using several web crystals was initiated. These cells will include surface passivation and double-layer antireflection coating. DOE

N85-15260*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PROCEEDINGS OF THE 23RD PROJECT INTEGRATION MEETING Progress Report, Sep. 1983 - Mar. 1984

Mar. 1984 523 p refs Meeting held in Pasadena, Calif., 14-15 Mar. 1984

(Contract DE-AI01-76ET-20356)

(NASA-CR-174186; JPL-Pub-84-47; NAS 1.26:174186; DOE/JPL-1012-99; FSA-PR-23) Avail: NTIS HC A22/MF A01 CSCL 10A

Silicon sheet growth and characterization, module technology, silicon material, cell processing and high-efficiency cells, environmental isolation, engineering sciences, module reliability, and project analysis and integration were described. For individual titles, see N85-15261 through N85-15298.

N85-15261*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

HIGH-EFFICIENCY SILICON SOLAR CELL RESEARCH

T. Daud *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 107-108 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

High efficiency solar cells were characterized. Silicon solar cell computer modeling was presented. New designs of matter insulator n-p (MINP) were discussed and a new structure called a floating emitter cell was proposed for 20% and higher efficiency. Various techniques for making high efficiency silicon solar cells were described. B.G.

N85-15262*# Research Triangle Inst., Research Triangle Park, N.C.

HIGH-EFFICIENCY SOLAR-CELL DESIGN MODELING

M. F. Lamorte *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 109-112 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Comprehensive computer models were developed to simulate single junction and multiple junction silicon solar cell structures. The following phenomena submodels were incorporated into computer models: effects due to temperature, impurities, defect energy levels, high injection, and surface states; front surface field, back surface field; oxide charged insulator; carrier confinement; bandgap narrowing; depletion region recombination; series resistance; metal contact shadowing; and anti-reflective coatings. Fabrication of 2 cm x 2 cm n(+)p and n(+)pp(+) near optimized silicon solar cells was done. The cells were characterized with respect to V(oc), 1(sc), P(mp), 1(mp), and eta over the temperature 25 C to 150 C. The accuracy of the computer modeling and correct phenomena submodels and/or analysis were assessed to obtain better than 5% agreement with experimental data. Phenomena that give rise to solar cell losses, were determined and quantified through analysis and experiments. B.G.

N85-15263*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

EFFICIENCY ESTIMATION AND SENSITIVITY MODELING

A. R. Mokashi *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 113-122 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

An exhaustive and comprehensive analytical tool for evaluating the performance of a crystalline silicon solar cell of a given design was developed. Cell process parameters were considered as input data. Sensitivity analysis of cell design parameters was performed. Innovative and conceptual designs were compared for achievement of high efficiency (near 20%). These methods were used as an aid in identifying parameters limiting cell efficiency below 20%. B.G.

N85-15264*# Sah (C. T.) Associates, Urbana, Ill.

BARRIERS TO ACHIEVING HIGH EFFICIENCY

C. T. Sah *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 123-130 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Accurate minority carrier recombination rate measurements by new capacitance transient method of Ti, Zn, and Au were performed. Capture rates at double donor titanium centers and double acceptor zinc centers over wide temperature ranges were completed. Limiting parameters and geometries were delineated. B.G.

N85-15265*# California Univ., Los Angeles.

MBE GROWTH FOR HIGH-EFFICIENCY SILICON SOLAR CELLS

F. Allen *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 131-138 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Extreme dopant control was utilized with molecular beam epitaxy (MBE) to grow silicon solar cells of high efficiency. Computerized simulation of a cascade silicon cell with two junctions in series as a means of getting large dc voltage and high efficiency was performed. B.G.

N85-15266*# Washington Univ., Seattle.

INVESTIGATION OF SILICON SURFACE PASSIVATION BY SILICON NITRIDE DEPOSITION

L. C. Olsen *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 139-146 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

The use of silicon nitride deposited by plasma enhanced CVD for passivation of the silicon surfaces was evaluated. Three approaches were used: SiN film growth by plasma enhanced chemical vapor deposition (PECVD); film characterization; and characterization of SiN/Si interfaces and impact on solar cell performance. B.G.

N85-15267*# Pennsylvania Univ., Philadelphia.

DEVELOPMENT AND ANALYSIS OF SILICON SOLAR CELLS NEAR 20% EFFICIENCY

M. Wolf and M. Newhouse *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 159-167 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01

The calibrated spectral light beam induced current (LBIC) was used to determine the minority carrier lifetimes in all regions of solar cells at various stages. It has permitted the observation of lifetime degradation occurring in the various process stages. B.G.

N85-15268*# Spectrolab, Inc., Sylmar, Calif.

ENCAPSULATION DESIGN ANALYSIS

Alexander Garcia, III *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 201-215 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

The methodology is developed to analyze photovoltaic en-

capsulation system designs. This methodology is approached using five models: (1) structural deflection analysis; (2) thermal structural analysis; (3) thermal analysis; (4) optical analysis; and (5) electrical analysis. B.W.

N85-15269*# Springborn Labs., Inc., Enfield, Conn.
ENCAPSULATION MATERIALS AND PROCESSING
P. B. Willis *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 217-244 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The advantages and deficiencies of several candidate polymer encapsulation materials are cited. Antisoiling treatments, fabrication concepts and aging studies are explored for photovoltaic module components. B.W.

N85-15270*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHOTOTHERMAL DEGRADATION OF ENCAPSULANTS
R. H. Liang *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 245-255 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

A mechanistic model to predict lifetime of encapsulants with respect to photothermal degradation is described. Valid accelerated photothermal testing procedures for evaluation of encapsulants are developed. B.W.

N85-15271*# Case Western Reserve Univ., Cleveland, Ohio.
POLYMER-POLYMER INTERFACE BOND STABILITY
J. L. Koenig *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 257-270 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The bond stability of the polymer/polymer interface of encapsulants is described. Infrared spectroscopy is used and optical properties are explored. B.W.

N85-15272*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
POLYMER-METAL INTERFACE BOND STABILITY
J. Boerio *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 271-277 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

An in-situ, non-destructive technique for determining stability of polymer/metal (oxide) interface is developed. The nature of degradation reactions occurring at polymer/metal (oxide) interface is determined and methods for inhibiting those reactions are developed. B.W.

N85-15273*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PREDICTING ELECTROCHEMICAL BREAKDOWN IN TERRESTRIAL PHOTOVOLTAIC MODULES
G. R. Mon *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 279-288 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Electrochemical corrosion of PV cells can cause a cell-to-frame short circuit with two undesirable results: (1) catastrophic loss of source-circuit power; and (2) high field maintenance (module replacement) costs. Parameter dependencies are determined and encapsulated two-cell coupons are exposed to a range of voltage differences, temperatures, and relative humidities. Material relative performance is assessed. Nine different metallization-encapsulation combinations are tested. B.W.

N85-15274*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MODULE FLAMMABILITY RESEARCH
R. S. Sugimura, D. H. Otth, J. Arnett (Arco Solar, Inc., Chatsworth, Calif.), and K. Lewis (Arco Solar, Inc., Chatsworth, Calif.) *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 289-292 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The technology base required to construct fire-ratable modules is explored. New materials of construction and module configurations to achieve increased fire resistance are investigated. The fire-resistance capability of current PV module designs is assessed. Parametric tests are performed to characterize flammability. B.W.

N85-15275*# Westinghouse Electric Corp., Pittsburgh, Pa.
PROCESS RESEARCH OF NON-Cz SILICON MATERIAL
C. M. Rose and R. B. Campbell *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 297-302 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

A feasibility evaluation of stimultaneously forming back & front junctions of solar cells using liquid dopants on dendritic web silicon is presented. Simultaneous diffusion is compared to sequential diffusion. A belt furnace test for diffusion process is carried out. Process control parameters and sensitivities are identified. Cost analyses are also performed. B.W.

N85-15276*# Solarex Corp., Rockville, Md.
PROCESS RESEARCH ON POLYCRYSTALLINE SILICON MATERIAL (PROPSM)
Jerry Culik *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 303-311 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Mechanisms limiting cell performance in large grain, cast, polycrystalline silicon sheet material were identified. Solar cell fabrication processes, compatible with limiting mechanisms, to improve performance and a passivation process, which includes process sensitivity analysis were developed. It is found that there is a strong correlation between quasineutral recombination and electrically active grain and subgrain boundaries; amount of LBIC imaged G.B. activity has little or no effect on spacecharge recombination or fill factor. Isolated cells have excess JSCO from defect that is not resolved by LBIC. E.A.K.

N85-15277*# California Inst. of Tech., Pasadena.
AMORPHOUS METALLIC LAYERS IN Si METALLIZATION SYSTEMS
Marc-A. Nicolet *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 313-320 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The advantages of amorphous metallic layers as diffusion barriers in metallization systems were investigated. Some of the advantages are: no grain boundaries, reduced reactivity, and flexibility. The formation of amorphous metallic layers, sheet resistance of amorphous Ni-W layer on SiO2 and Si substrate, crystallization and reaction with Si, and Schottky barrier heights of amorphous RF-sputtered metallic thin film, are outlined. E.A.K.

N85-15278*# Purdue Univ., Lafayette, Ind.
METALLO-ORGANIC DECOMPOSITION (MOD) SILVER METALLIZATION FOR PHOTOVOLTAICS
G. M. Vest and R. W. Vest *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 321-332 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The metallo-organic decomposition (MOD) silver metallization process for photovoltaics was investigated. It is found that: (1) generic compounds are essential; (2) high purity raw materials are very important; (3) proper time temperature processing is critical; and MOD silver shows great promise for low temperature metallization. E.A.K.

N85-15279*# Spectrolab, Inc., Sylmar, Calif.
A NONNOBLE FRONT METALLIZATION PROCESS
Alexander Garcia, III *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 333-342 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

The optimization, evaluation and demonstration of a novel metallization system is presented. The Mo/Sn/TiH system and the ITO conductive AR systems are discussed. It is concluded that Mo/Sn has adequate conductivity for screen printing; shunting is never a problem; solderability is a major problem, more work is needed on wetting phenomena, and cellulosic vehicle is the best. It is shown that various additives are unsuccessful on improving adhesive and that tin does not wet the system at low temperature. E.A.K.

N85-15280*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

VISCOSITY MEASUREMENTS FOR THICK-FILM PASTES

J. Parker (Electrink, Inc.) *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 343-351 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Viscosity for thick film pastes was measured. It is found that: (1) the thick films are convenient to make; (2) can be reproduced; (3) relate to production applications; and (4) correlate to the composition and condition of the material. It is concluded that good reproducibility of viscosity measurements for thixotropic materials requires scheduled measurements and close temperature control, and that contents can be calculated from three or more measurements at different shear rates and an iterative computer program. E.A.K.

N85-15281*# Spire Corp., Bedford, Mass.

EVALUATION OF THE ION IMPLANTATION PROCESS FOR PRODUCTION OF SOLAR CELLS FROM SILICON SHEET MATERIALS

M. B. Spitzer *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 353-364 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

The application of the ion implantation process to present day materials and fabricate cells and temperature effects were investigated. Thermal annealing was compared to pulsed electron beam annealing. It is found that use of ion implantation allows tailoring of thermal process to a particular sheet material; EFG is improved after high temp; SILSO is degraded after high temp; HEM affected most at 550 to 750 deg C; SEMIX appears independent of process temp; and CZ is degraded by processing at 750 deg C. It is concluded that ion implantation and rapid thermal annealing can be successfully employed for junction formation. E.A.K.

N85-15282*# Westinghouse Electric Corp., Pittsburgh, Pa.

LASER-ASSISTED SOLAR-CELL METALLIZATION PROCESSING

S. Dutta and P. G. McMullin *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 365-375 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Laser assisted solar cell metallization processing which is a one step process is examined. The potential advantages of laser disposition techniques for photovoltaic systems are: a high resolution, no photolithography, clean and contamination free, in-situ sintering, and low contact resistance. E.A.K.

N85-15283*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ION CLUSTER BEAM DEPOSITION RESEARCH

Dennis Fitzgerald *In its* Proc. of the 23rd Proj. Integration Meeting Mar. 1984 p 377-379 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Ion cluster beam deposition research is discussed. Results of metal deposition on silicon were verified. Other PV applications of ICB such as dielectric and semiconductor deposition were investigated and ICB beam as a function source parameters was characterized. It was found that: (1) cluster formation requires crucible pressure in range of 1 to 10 torr (1350 C to 1550 C for silver); (2) problems precluded operation above 1400 deg C; (3) silver deposition at 1400 deg C looked uniform but failed tape pull test; (4) current ICB modifications should permit operation at much higher temperatures. A need for cluster detector to identify presence and size of clusters is indicated and a substrate heater to make proper bond of metal to substrate may be required. E.A.K.

N85-15284*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

MINIWORKSHOP ON EFFECTS OF STRESS AND STRAIN IN HIGH-SPEED-GROWTH SILICON RIBBONS

A. Briglio, Jr. *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 389-392 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

The effects of stress and strain in high speed grown silicon ribbons are discussed. Problems of stress and strain which are limiting to the rate at which SI ribbons of suitable quality for making solar cells are grown, are examined. E.A.K.

N85-15285*# Mobil Tyco Solar Energy Corp., Waltham, Mass.

STRESS STUDIES IN EFG

J. P. Kalejs *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 393-409 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Stress studies in edge-defined film-fed growth (EFG) are discussed. The goals were to develop an understanding of the mechanism of stress generation in silicon sheet growth and to define minimum stress growth configurations 200 micron thick 10 cm wide EFG ribbon growing at 4 cm/min. R.J.F.

N85-15286*# Westinghouse Electric Corp., Pittsburgh, Pa.

ADVANCED DENDRITIC WEB GROWTH DEVELOPMENT

C. S. Duncan *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 411-416 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

Computer specifications for low stress dendritic crystal web growth configurations having thermal elements in fixed positions were developed, as well as computer specifications for web growth incorporating dynamic positioning of thermal elements. Low buckling stress with increased width of unbuckled growth was sought, as well as increased growth velocity while maintaining low residual stress. Model-defined advanced concepts for web growth configurations were defined and verified in experimental web growth. Major increases were achieved in width and velocity. R.J.F.

N85-15287*# Illinois Univ., Chicago.

SILICON-SHEET SURFACE STUDIES

S. Danyluk *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 417-424 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

The nondestructive determination of residual stresses in short sections of sheet silicon is discussed. A laser interferometry technique for polished surfaces; a shadow Moire technique, for rough surfaces, to determine deflections in sheet silicon; and an analysis of extracting residual stresses from measured deflections of circular wafers and short rectangular wafers are discussed. R.J.F.

N85-15288*# Midwest Research Inst., Golden, Colo.

INVESTIGATION OF STRUCTURAL AND ELECTRICAL PROPERTIES OF LOW-ANGLE SILICON SHEET

Y. S. Tsuo, R. J. Matson, and J. B. Milstein *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 425-427 (For primary document see N85-15260 06-44)

Avail: NTIS HC A22/MF A01 CSCL 10A

By using a combination of secondary electron imaging, electron

channeling, and electron-beam induced current techniques in an electron microscope, the structural and electrical properties of defects in low-angle silicon sheet material were correlated. The technique proved useful in correlating the structural and electrical properties of highly defected or polycrystalline semiconductor materials. R.J.F.

N85-15289*# Semix, Inc., Gaithersburg, Md.
SEMICRYSTALLINE CASTING PROCESS DEVELOPMENT AND VERIFICATION
W. F. Regnault *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 429-438 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Structural defects within grain volumes that affect the efficiency of semicrystalline silicon solar cell materials are discussed. The purpose was to determine the nucleating mechanisms of a dislocation substructure occasionally found in semicrystalline silicon, to determine the relative crystallographic orientation of neighboring grains, to correlate the observed dislocation structure with the electrical response of the material, and to develop a computer simulation of the ubiquitous crystallization process in order to model the time dependence of the solidification front and to aid in the study of temperature distribution with an ingot. R.J.F.

N85-15290*# Energy Materials Corp., Harvard, Mass.
ELECTROCHEMICAL PRODUCTION OF SILICON
H. E. Bates *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 439-447 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Siline decomposition in a fluidized bed reactor was studied. Long duration tests were conducted to demonstrate operability and determine purity. Preliminary product purity from a metal wall reactor was established. A fluidized bed reactor product was melted. R.J.F.

N85-15291*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JPL IN-HOUSE FLUIDIZED-BED REACTOR RESEARCH
G. C. Hsu *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 449-455 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Data is given on metallic impurities in fluidized bed reactors (FBR). Various wall materials for FBR's are characterized. Reaction paths for FBR's and conditions for the incorporation of homogenous fines onto seed particles are discussed. Scavenging experiment data and jet mill grinding data are given. R.J.F.

N85-15292*# California Inst. of Tech., Pasadena.
AEROSOL REACTOR FOR SILICON PROCESSING
R. C. Flagan, M. K. Alam, B. E. Johnson, and J. J. Wu *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 457-467 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Silane pyrolysis, homogeneous nucleation; and an aerosol reactor for the growth of large silicon particles by silane pyrolysis are discussed. Graphs show data on temperature profile and reaction kinetics in the aerosol reactor, as well as particle growth, total clearance volume fraction, mass distribution of silicon aerosol in high temperatures, and silicon losses as a function of input silane concentration. R.J.F.

N85-15293*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANALYSIS OF OPTICAL AND ELECTRICAL PERFORMANCE OF A TCP-COATED SOLAR CELL
R. E. Daniel *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 479-487 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The effect of the optical and electrical properties of a transparent conducting polymer (TCP) on a solar cell, and the effect of transmission, reflection and absorption of the TCP on the operating characteristics of the solar cell was analyzed. Examination of TCP film thickness and conductivity on the generated photo current with a tolerable series resistance was done. B.G.

N85-15294*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERFORMANCE LOSS WITH SHORTED CELLS
C. C. Gonzalez *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 489-494 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The power loss due to shorted cells for a given source-circuit series-parallel configuration after n years with a constant yearly failure rate; the optimum series-parallel confituration(s) for minimizing power loss; and the cost-effective failure level were determined. Author

N85-15295*# Clemson Univ., S.C.
INVESTIGATION OF ACCELERATED STRESS FACTORS AND FAILURE/DEGRADATION MECHANISMS
J. W. Lathrop *In* JPL Proc. of the 23rd Project Integration Meeting Mar. 1984 p 495-502 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Results of the performance tests on unencapsulated cells are described. Equivalent circuit parameters; characteristics of a degraded solar cell; and atomic and molecular species at the cell surface are detailed. B.G.

N85-15296*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THERMAL CHARACTERIZATION OF PHOTOVOLTAIC MODULES IN NATURAL ENVIRONMENTS
L. Wen *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 503-513 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

The physics of module thermal interaction with natural environments was examined. Specific recommendations were developed relative to nominal operating cell temperature (NOCT) test procedure and evaluation methodology. Refined algorithms were provided for predicting PV array operating temperatures. B.G.

N85-15297*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANNUAL ENERGY SPECTRUM FOR TRACKING ARRAYS
C. C. Gonzalez *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 515-518 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Array energy spectra for different tracking modes were compared, and the advantage of a given mode for any defined cell spectral response was assessed. Computer code and hour-by-hour SOLMET irradiance data were used to obtain hourly integrated irradiance for array tracking mode. Solar radiation spectral analysis computer code was used to estimate amount of hourly irradiance in given wavelength intervals. An annual and monthly integration of irradiance was done in each wavelength interval; result is independent of any particular cell spectral response. In addition, an annual and monthly integration of the convolution of a given cell spectral response and the hourly solar energy spectral distribution was done. B.G.

N85-15298*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SUMMARY OF PHOTOVOLTAIC PERFORMANCE MODELS
J. H. Smith and L. J. Reiter *In its* Proc. of the 23rd Project Integration Meeting Mar. 1984 p 519-525 (For primary document see N85-15260 06-44)
Avail: NTIS HC A22/MF A01 CSCL 10A

Computer models which are usually placed in the category of

photovoltaic systems performance models are described. These cover a range of approaches and capabilities from aggregate, first-order models to far more detailed analyses of PV systems. The complete set of models which fit this criteria is presented and reviewed. This information is presented in an easily reference-able format. This work was performed for the Project Analysis and Integration Center at JPL. B.W.

N85-15299# Thermacore, Inc., Lancaster, Pa.
POWER FLATTENING TECHNIQUES FOR RADIOISOTOPIC THERMOELECTRIC GENERATORS Final Report
G. Y. Eastman Jul. 1984 75 p
(Contract N00014-84-C-0060; ARPA Order 4941)
(AD-A146365) Avail: NTIS HC A04/MF A01 CSCL 10/2

The objective of this program was the investigation of a novel means of reducing the potential ecologic hazards that may be associated with radioisotopic thermoelectric generators (RTG's). A number of short lived isotopes have lower toxicities and are more ecologically acceptable than the Plutonium 238 used at present. In addition, the shorter half lives significantly reduce the time period during which isotope encapsulation must be assured (approximately 10 half lives). The technical approach involves the use of a gas controlled heat pipe to maintain a nearly constant heat input to the thermoelectric converter in spite of the decay profile of a short lived isotopic heat source. Excess thermal power available early in life, is automatically shorted around the thermoelectric module by way of the heat pipe. A development model of a gas controlled heat pipe capable of performing the required task was constructed and tested during this program. GRA

N85-15300# General Electric Co., Wilmington, Mass. Aircraft Equipment Div.
INVESTIGATION OF BROMINE COMPLEXED HYDROGEN/BROMINE REGENERATIVE FUEL CELLS FOR PORTABLE ELECTRIC POWER Final Report, Jul. 1982 - May 1984
J. A. Kosek and A. B. LaConti Sep. 1984 38 p
(Contract DAAK70-82-C-0088)
(AD-A146401; USAMERDC-38) Avail: NTIS HC A03/MF A01 CSCL 10/2

A novel polyethylene glycol-bromine complexing system has been developed which significantly lowers the vapor pressure of bromine in a hydrogen/bromine fuel cell. The effect of temperature and acid concentration on complex formation have been studied. Heats of formation and rate constants for complex dissociation have been measured. A cathode has been optimized for use with bromine in a hydrogen/bromine fuel cell. Fuel cell performance utilizing the complex as a source of bromine was investigated. Author (GRA)

N85-15301# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EXPERIMENTAL AND THEORETICAL STUDY OF A SOLAR THERMOCHEMICAL RECEIVER MODULE
Y. S. Won, G. E. Voecks, and J. H. McCrary (New Mexico State Univ.) 15 Jul. 1984 34 p refs
(Contract DE-AM04-80AL-13137)
(DE85-000352; DOE/JPL-1060-76; JPL-Pub-84-53) Avail: NTIS HC A03/MF A01

A few years ago, a prototype test module of a solar thermochemical receiver using an SO2/SO3 reaction system was designed, built, and tested to establish a technical data base for future subsystem design efforts. Emphasis was placed on experimental verification of the computer simulation to establish a reliable design tool to predict the thermochemical performance of the receiver with a reasonable degree of confidence. The computational results were compared with experimental results obtained from the module tested at New Mexico State University. Reasonable agreement was found over a range of test conditions. It was concluded that the present design offers satisfactory conversion performance and operational flexibility for the construction of a complete reactor/receiver unit for use in a 10 to 15 kW dish collector system. DOE

N85-15302*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE 22ND PROJECT INTEGRATION MEETING Progress Report, Jan. - Sep. 1983
1983 629 p Meeting held in Pasadena, Calif., 28-29 Sep. 1983
(Contract DE-AI01-76ET-20356; JPL Proj. 5101-242)
(DE85-000334; DOE/JPL-1012-94; JPL-Pub-84-2; CONF-8309276-Summ; PR-22) Avail: NTIS HC A99/MF A01

This report describes progress made by the Flat-Plate Solar Array Project during the period January to September 1983. It includes reports on silicon sheet growth and characterization, module technology, silicon material, cell processing and high-efficiency cells, environmental isolation, engineering sciences, module performance and failure analysis and project analysis and integration. It includes a report on, and copies of visual presentations made at the 22nd Project Integration Meeting held at Pasadena, California, on September 28 and 29, 1983. DOE

N85-15303# National Coal Board, Grimethorpe (England).
TURBINE BLADE TEST CASCADE MODIFICATIONS AND ORATIONS, AUGUST 1982 - APRIL 1983
Mar. 1984 83 p refs Sponsored in part by Dept. of Energy, England and Kernforschungsanlage Juelich GmbH, West Germany
(Contract DE-AI01-76ET-10393)
(DE84-009268; DOE/ET-10393/1598) Avail: NTIS HC A05/MF A01

A turbine blade test cascade was installed for research into erosion and corrosion of turbine blade materials caused by the constituents of the exhaust gas. Commissioning of the cascade loop and the installation of the blades are reported. The facility was operated for 985 coal burning hours, the cascade loop was on line for 553 hours and the test blades exposed for 33.5 hours. The major problems were: seizure of valves used to discharge hot dust from the exhaust gas clean up system, and poor performance of a gas path heat exchanger due to dust built up on heat transfer surfaces. Modifications were made to improve the reliability and performance of the cascade loop. DOE

N85-15304# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ADVANCES AND OPPORTUNTIES IN THE AMORPHOUS SILICON RESEARCH FIELD
E. Sabisky, W. Wallace, A. Mikhail, H. Mahan, and Y. S. Tsuo May 1984 8 p refs Presented at 17th IEEE Photovoltaic Specialists Conf., Orlando, Fla., 1 May 1984
(DE84-004526; SERI/TP-211-2339) Avail: NTIS HC A02/MF A01

The amorphous materials and thin film solar cells program is discussed. Photovoltaic research in single junction amorphous thin films and the most promising option in high efficiency, multijunction solar cells are addressed. A stable, small area, p-i-n solar cell of at least 12% (AMI) efficiency, submodule of at least 8% (AMI) efficiency, a stable and a proof of concept multijunction amorphous silicon alloy thin film solar cell that will lead to achieving an 18% efficiency goal are demonstrated. DOE

N85-15305# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
RECENT DEVELOPMENTS IN PHOTOVOLTAICS
J. Stone, E. Witt, R. McConnel, T. Flaim, T. Surek, and D. Ritchie May 1984 8 p refs Presented at the 17th IEEE PV Spec. Conf., Orlando, Fla., 1-5 May 1984
(Contract DE-AC02-83CH-10093)
(DE84-004528; SERI/TP-211-2335; CONF-840561-24) Avail: NTIS HC A02/MF A01

The long term cost and efficiency goals of the recently issued National Photovoltaics Program Five-Year Research Plan, technical goals which are based on a constant dollar electricity cost target of 6.5 cents/kWh is described. Material requirements for estimating the potential of different PV technologies to meet these goals are assessed. This assessment suggests that thin film PV technologies, especially amorphous silicon, have much potential for achieving

the long term goals. The recent achievements and near term thrusts of the research efforts conducted are described. DOE

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N85-15306# Brookhaven National Lab., Upton, N. Y. Dept. of Applied Science.
ATTEMPTED MEASUREMENT OF GASEOUS H-2O-2 IN THE AMBIENT ATMOSPHERE
H. M. tenBrink (Netherlands Energy Research Center ECN, Petten), T. J. Kelly, Y. N. Lee, and S. E. Schwartz Apr. 1984 8 p refs Presented at the 3rd European Symp. on the Phys.-Chem. Behavior of Atmospheric Pollutants, Vareses, Italy, 11-13 Apr. 1984
(Contract DE-AC02-76CH-00016)
(DE85-001937; BNL-35207; CONF-8404191-1) Avail: NTIS HC A02/MF A01

The concentration of H2O2 observed in cloud water is indicative of gas phase concentrations of 0.1 to 1 ppB of H2O2 in the atmosphere. Recent direct measurements of gaseous H2O2 in the atmosphere proved to be unsuccessful because of artifact formation of H2O2 during sampling and analysis. In the existing methods for the determination of the gas, ambient air is passed through impingers to collect H2O2 in the aqueous phase. Attempts were made in the present study to overcome the artifact formation of H2O2 by trying different types of sampling devices and by using a new analysis technique for the measurement of dissolved H2O2. It was found that the artifact H2O2 formation occurred irrespective of the type of collector and analysis method. This artifact H2O2 formation is evidenced by the presence of comparable concentrations of H2O2 in collectors placed in series during air scrubbing. Artifact H2O2 was highest in highly photochemically active air masses and only on clean days did the amount of artifact H2O2 appear to be low. DOE

N85-15307# National Oceanic and Atmospheric Administration, Rockville, Md. Air Resources Lab.
CROSS-APPALACHIAN TRACER EXPERIMENT (CAPTEX '83)
Terry L. Clark, Gilbert J. Ferber, Jerome L. Heffter, and Roland R. Draxler Aug. 1984 7 p ref Sponsored in part by EPA
(PB84-238641; EPA-600/D-84-214) Avail: NTIS HC A02/MF A01 CSCL 13B

Scientists in the United States and Canada have collaborated on the Cross-Appalachian Tracer Experiment (CAPTEX '83) using the perfluorocarbon tracer to simulate the long range transport of pollutants in the atmosphere. The experiments, conducted in September and October of 1983 in the northeastern United States and southern Ontario, yielded approximately 3000 3-6 hour surface samples and over 1600 integrated airborne samples. In addition, supplemental meteorological data were measured. This paper describes the experiments and the data. GRA

N85-15308# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
INDIRECT ESTIMATION OF CONVECTIVE BOUNDARY LAYER STRUCTURE FOR USE IN ROUTINE DISPERSION MODELS Final Report
James M. Wilczak and Mary Sue Phillips Aug. 1984 89 p refs Sponsored in part by EPA
(PB84-238260; EPA-600/3-84-091) Avail: NTIS HC A05/MF A01 CSCL 13B

Dispersion models of the convectively driven atmospheric boundary layer (ABL) often require as input meteorological parameters that are not routinely measured. These parameters usually include (but are not limited to) the surface heat and momentum fluxes, the height of the capping inversion Z(i), the mean windspeed, wind direction and temperature profiles up to Z(i), and the profiles of the turbulent wind components. Through use of a simple inversion rise model, surface layer flux-profile relationships, and similarity scaling laws for the convective ABL, the required meteorological parameters can be deduced using much simpler and more readily available measurements. These measurements consist of an early morning temperature profile obtained from a radiosonde ascent; single level surface layer values of U, AZ, sigma sub u and sigma sub v; two levels of mean temperature near the surface; and an estimate of the local surface roughness. Predicted values of each of the required parameters are compared to directly measured values of 26 days of data. GRA

N85-15309# Environmental Protection Agency, Research Triangle Park, N.C. Data Management and Analysis Div.
RESULTS OF THE CARBON MONOXIDE STUDY IN WASHINGTON, D.C. AND DENVER, COLORADO, IN THE WINTER OF 1982-83
Gerald G. Akland, Ted Johnson (PEDCo., Durham, N.C.), and Tyler Hartwell (Research Triangle Inst., Research Triangle Park, N.C.) Jul. 1984 8 p refs
(PB84-230069; EPA-600/D-84-178) Avail: NTIS HC A02/MF A01 CSCL 06T

The paper will briefly describe the study of population exposure to carbon monoxide for the residents of the Washington, D.C. area and the Denver, Colorado area in the winter of 1982-83. The population exposure distributions were determined by direct measurement of CO with personal exposure monitors (PEM's) through the use of statistical inference from a statistically drawn sample. The population of inference for the study was non-smoking, non-institutionalized adults (age 18-70). Each sampled individual carried a PEM for a 24-hour period on one pre-scheduled day in Washington, D.C., and two consecutive days in Denver. The exposure distributions from each study area will be contrasted and factors pertaining to high exposure will be discussed. GRA

N85-15310# PEDCo-Environmental, Inc., Durham, N.C.
NAAQS (NATIONAL AMBIENT AIR QUALITY STANDARDS) EXPOSURE MODEL (NEM) APPLIED TO CARBON MONOXIDE Final Report
Ted Johnson and Roy A. Paul Dec. 1983 197 p refs Sponsored by EPA
(PB84-242551; EPA-450/5-83-003) Avail: NTIS HC A09/MF A01 CSCL 13B

This report presents a version of the National Ambient Air Quality Standard (NAAQS) Exposure Model (NEM) suitable for assessing carbon monoxide (CO) exposure and presents the results of applying it to CO. NEM is a simulation model that simulates the intersection of a population with pollutant concentrations over space and time to estimate exposures that would obtain if various alternative NAAQS were just met. Estimates are presented for adults with cardiovascular disease in four urban study areas and for a nationwide extrapolation. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N85-15311# Danish Space Research Inst., Lyngby.
BIRKELAND CURRENTS CORRELATED WITH dc-ELECTRIC FIELDS OBSERVED DURING THE CENTAUR BBX ROCKET EXPERIMENTS
F. Primdahl and G. Marklund (Royal Inst. of Technology, Stockholm) 1984 22 p refs
(DRI-6-84; ISSN-0109-6605) Avail: NTIS HC A02/MF A01

Vector magnetic field observations from two rocket flights in the winter polar cusp during the Centaur project show several groups of up- and downflowing small scale Birkeland current sheets in the afternoon region of the cusp, whereas none are detected at noon. High correlation with electric field observations allowed

calculation of the height-integrated Pedersen conductivity, and an estimate was made of the ionospheric input power density associated with the Birkeland currents. This input power density was comparable to that of a similar summertime experiment at nearly the same MLT and during almost the same IMPF conditions, despite an order-of-magnitude different ionospheric conductivity. Indications are that the magnetospheric energy source acts as a constant power generator rather than a voltage or a current generator. Author

N85-15312# Teledyne Geotechnical, Alexandria, Va.
EVALUATION OF THE RSTN (REGIONAL SEISMIC TEST NETWORK) NETWORK AND FURTHER IMPROVEMENT TO AUTOMATIC ASSOCIATION Technical Progress Report, 24 Jul. 1979 - 10 Jan. 1983
R. R. Blandford, J. Goncz, R. Baumstark, and K. L. McLaughlin 30 Oct. 1983 92 p
(Contract F08606-79-C-0007)
(AD-A146395; TGAL-TR-83-5) Avail: NTIS HC A05/MF A01 CSCL 08/11

The Regional Seismic Test Network (RSTN) is a 5-station seismic network designed to monitor regional seismicity on the scale of a large continental shield. The RSTN serves as a prototype for a network that could be deployed for test ban treaty verification. Both regional and teleseismic signals are digitally recorded for three components of Earth motion in three overlapping frequency bands covering 0.02 to 10 Hz. The approach of this study was to select 9 events recorded by the network and manually analyze the recordings using available software at the CSS. Various phases were identified and picked as well as possible, back azimuths were estimated, and signal-to-noise ratios were determined. Finally, detection thresholds as a function of distance were estimated for P, Lg and L sub R phases using the signal-to-noise ratios of the 9 events. Several existing CSS software packages were tested using the RSTN evaluation data. GRA

N85-15313# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
ELECTRIC FIELDS IN EARTH ORBITAL SPACE Annual Report, Jun. 1983 - Sep. 1984
W. P. Olson, K. A. Pfitzer, and S. Schneider Sep. 1984 51 p
(Contract N00014-80-C-0796)
(AD-A146448; MDC-H1666) Avail: NTIS HC A04/MF A01 CSCL 04/1

We had developed a model of the ground state magnetosphere prior to this report and have suggested that the basic magnetosphere is formed and maintained simply by the interaction of the solar wind with the geomagnetic field. It is known, however, that the magnetosphere responds dynamically to changes in the interplanetary magnetic field (IPMF). Instead of the qualitative reconnection theory (which we believe is basically incorrect), we have examined this response in terms of electromagnetic wave propagation in the interplanetary region. We suggest that the interplanetary plasma (solar wind) is magnetized by the solar magnetic sector structure. Electromagnetic waves of higher frequency can propagate through the solar wind without appreciable attenuation. It is the interaction of these disturbance waves with the magnetosphere that causes the observed magnetospheric response to the IPMF. We have examined quantitatively the propagation of electromagnetic disturbances in the interplanetary region and their interaction with the magnetosphere. Only certain modes propagate and there are further restrictions on the waves at the magnetopause. We show that a southward IPMF produces the most dramatic magnetospheric response in the tail region and a northward IPMF in the polar cusp region. Further work on propagation of these fields within the magnetosphere and on a quantitative examination of their oblique incidence on the magnetopause is suggested. We believe this work will help us to quantitatively understand the magnetosphere's dynamic response to the IPMF and should lead to a quantitative predictive capability for many magnetospheric features. Author (GRA)

N85-15314# Lincoln Lab., Mass. Inst. of Tech., Lexington.
CORRECTION FOR ATMOSPHERIC REFRACTION IN AN AIRBORNE, OPERATIONAL ENVIRONMENT
J. M. Sorvari 31 Aug. 1984 38 p
(Contract F19628-80-C-0002)
(AD-A146552; TR-701; ESD-TR-84-037) Avail: NTIS HC A03/MF A01 CSCL 04/1

A scheme for correcting the effect of atmospheric refraction is described. The scheme minimizes the amount of computation required in real-time applications. Values derived reproduce observed data very well. There is a residual uncertainty in typical airborne applications; using the simplest scheme this amounts to about 33 micro r. A few suggested improvements to the scheme reduce the uncertainty below 10 micro r. Author (GRA)

N85-15315# Naval Weapons Center, China Lake, Calif.
VISIBILITY MONITORING IN THE SOUTHERN CALIFORNIA DESERT FOR THE DEPARTMENT OF DEFENSE: RESEARCH ON OPERATIONS-LIMITING VISUAL EXTINCTION, RESOLVE PROTOCOL
D. Blumenthal and J. Trijonis Sep. 1984 38 p
(AD-A146617; NWC-TP-6566) Avail: NTIS HC A03/MF A01 CSCL 04/1

A decrease in visibility in the R2508 airspace (in the western Mojave Desert in southern California) since the mid-1940s, when flight test and training facilities were established in this region, is adversely affecting flight and test operations. The Joint Policy and Planning Board (JPPB) of the Department of Defense has initiated studies and discussions of the visibility issue with the goal of developing a management strategy to maintain and optimize the operational capabilities of the test facilities. To identify trends in and sources of visibility degradation in the desert, JPPB initiated two programs: (1) a compilation and review of the historical visibility and air quality data in the California desert region, to be coordinated by the California Desert Air Working Group (CDAWG) and funded by CDAWG participants; and (2) RESearch on Operations-Limiting Visual Extinction (RESOLVE), which involves measuring the visibility at key receptor sites (monitoring stations) in the R2508 region. The report describes the current status of and future plans for the RESOLVE program. Author (GRA)

N85-15316# Geosciences Research Associates, Inc., Bloomington, Ind.
POTENTIAL GEOLOGICAL NATURAL LANDMARKS OF THE EAST GULF COASTAL PLAIN Final Report
Richard L. Powell 1983 446 p refs
(PB84-230317) Avail: NTIS HC A19/MF A01 CSCL 08G

This study is one of a series of 61 which cover the natural regions of the United States, defined largely by Fenneman (1928). Each study describes the ecological and/or geological features characteristic of that region, then evaluates sites representative of those features. Sites which are outstanding examples are proposed as potential National Natural Landmarks. This report describes 105 areas of geologic significance throughout the East Gulf Coastal Plain Section of the Coastal Plain Province. That section includes portions of Alabama, Florida, Georgia, Illinois, Kentucky, Louisiana, Mississippi, and Tennessee. Sites are described, evaluated, and given a priority rating based on their representation of geologic themes, landforms and stages of Earth and life history characteristic of the region. GRA

N85-15317# National Center for Atmospheric Research, Boulder, Colo. Convective Storms Div.
DISTRIBUTION OF THE K-CORONA OVER THE POLAR REGIONS OF THE SOLAR DISK: 1965-1983
R. Fisher and P. Seagraves Jan. 1984 222 p
(PB84-230077; NCAR/TN-224) Avail: NTIS HC A10/MF A01 CSCL 03B

The goal of this technical note is to present a set of synoptic observations from the Mauna Loa series of K-coronameters in polar projection format. The initial motivation for the production of these plots was the desire to present data that would be useful in the study of the evolution of high-latitude coronal streamers

over the solar cycles 20 and 21. It now seems likely that there will be other uses for these data. Possibly the variation of coronal hole area over sunspot cycle can be extracted from the data presented below, and it is anticipated that the POLES plots of the north and south polar regions will provide an interesting adjunct data set for the upcoming ISPM mission, now scheduled for the minimum of the present sunspot cycle. Only east limb data have been used for this project. Author (GRA)

N85-15318# Geological Survey, Menlo Park, Calif. Geologic Div.
GEOCHEMICAL DATA FOR ROCK SAMPLES FROM THE PETERSBURG AND PARTS OF THE PORT ALEXANDER AND SUMDUM QUADRANGLES, SOUTHEASTERN ALASKA (DOCUMENTATION)
R. D. Koch, S. M. karl (Geological Survey, Anchorage, Alaska), G. W. Day (Geological Survey, Golden, Colo.), J. D. Hoffman (Geological Survey, Golden, Colo.), S. K. McDanal (Geological Survey, Golden, Colo.), and R. M. OLeary (Geological Survey, Golden, Colo.) May 1984 28 p refs
(PB84-234434; DOI-DF-84-005A) Avail: NTIS HC A03/MF A01 CSCL 08D

Geochemical data from rock samples collected in the Petersburg, parts of the Port Alexander, and Sumdum quadrangles, southeastern Alaska is given. One file contains data from 6974 rock samples. Data includes analyses for up to 31 elements by emission spectroscopy and up to 5 elements by atomic absorption techniques and geodetic coordinates in decimal degrees. Rock samples are labeled with the rock type sampled, geologic map unit, geologic age, whether visibily mineralized or not, and geochemical affinity grouping. Sampling procedures are described and references are listed. GRA

N85-15011# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL RESULTS OF STUDY OF ARTIFICIAL PERTURBATION REGION IN UPPER AND LOWER IONOSPHERE DISTURBANCE BY THE METHOD OF VERTICAL PROBING Abstract Only
Ye. A. Benediktov, N. P. Goncharov, Yu. A. Ignatyev, S. N. Matyugin, and P. B. Shavin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 14 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 12-17 Original language doc. previously announced as A84-27077 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15012# Joint Publications Research Service, Arlington, Va.
FIELD COHERENCE FUNCTION IN LAYERWISE NONHOMOGENEOUS TROPOSPHERE Abstract Only
A. V. Kukushkin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 14-15 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 18-27 Original language doc. previously announced in IAA as A84-27078 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15016# Joint Publications Research Service, Arlington, Va.
RELATION BETWEEN POLARIZATION OF ARTIFICIAL LOW FREQUENCY RADIATION AND PARAMETERS OF AURORAL IONOSPHERE Abstract Only
V. F. Larin, V. S. Smirnov, A. N. Vasilyev, A. A. Ostapenko, and L. Ye. Solovyeva *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 17 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 27, no. 1, Jan. 1984 p 104-105 Original language doc. previously announced in IAA as A84-27086 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15205# Joint Publications Research Service, Arlington, Va.
SOME METHODOLOGICAL ASPECTS OF STUDY OF LAYER ASSOCIATIONS IN CONTINENTS AND OCEANS Abstract Only
G. L. Kirillova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 49-50 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 106-109 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15206# Joint Publications Research Service, Arlington, Va.
EARTHQUAKES AND TECTONICS OF PACIFIC OCEAN MARGINS
L. M. Balakina *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 53-62 Transl. into ENGLISH from Priroda (Moscow), no. 3, Mar. 1984 p 27-33 (For primary document see N85-15196 06-42)
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N85-15208# Joint Publications Research Service, Arlington, Va.
THERMAL ENERGY RESOURCES OF THERMAL WATERS IN KAZAKHSTAN
V. S. Zhevago and Zh. S. Sydykov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 84-96 refs Transl. into ENGLISH from Vestn. Akad. Nauk Kazakhs. SSR (Alma-Ata), no. 6, Jun. 1984 p 52-56 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15209# Joint Publications Research Service, Arlington, Va.
STATISTICAL RELATIONSHIP OF STRONG EARTHQUAKES WITH PLANETARY GEOMAGNETIC FIELD ACTIVITY Abstract Only
M. M. Pogrebnikov, N. I. Komarovski, Yu. A. Kopytenko, and A. P. Pushel *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 97 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 339-340 (For primary document see N85-15196 06-42)
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N85-15210# Joint Publications Research Service, Arlington, Va.
ANOMALOUS MAGNETIC FIELD IN NORTHWESTERN PACIFIC OCEAN AND PACIFIC OCEAN PLATE KINEMATICS Abstract Only
A. M. Gorodnitskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 98 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 22-31 (For primary document see N85-15196 06-42)
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N85-15211# Joint Publications Research Service, Arlington, Va.
BOUNDARY VELOCITIES OF MOHOROVICIC DISCONTINUITY AND UPPER MANTLE STRUCTURE OF PACIFIC OCEAN BED Abstract Only
N. Ya. Kunin and G. I. Semenova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 99 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 32-37 (For primary document see N85-15196 06-42)
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N85-15212# Joint Publications Research Service, Arlington, Va.
DEEP STRUCTURE OF TERRESTRIAL CRUST AND UPPER MANTLE IN SOUTHEASTERN SIBERIA AND FAR EAST ACCORDING GEOLOGICAL-GEOPHYSICAL DATA Abstract Only
L. Ye. Shustova *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 99-100 Transl. into ENGLISH from Tikhookeanskaya Geol. (Novosibirsk), no. 2, Mar. - Apr. 1984 p 46-51 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15213# Joint Publications Research Service, Arlington, Va.
CORRELATION RADIUS OF GRAVITATIONAL AND MAGNETIC ANOMALIES AND METHODS OF ITS DETERMINATION Abstract Only
S. A. Serkerov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 100-101 Transl. into ENGLISH from Geomagnet-

izm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 285-290 (For primary document see N85-15196 06-42)
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N85-15214# Joint Publications Research Service, Arlington, Va.
SELECTION OF SPACING OF MODULAR AND GRADIENT MEASUREMENT SURVEYS BASED ON STATISTICAL CHARACTERISTICS OF MEASURED GEOMAGNETIC FIELD Abstract Only
V. G. Boyarskikh, I. G. Zolotov, and Ye. N. Roze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 100-101 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 291-296 Original language document was announced in IAA as A84-31971 (For primary document see N85-15196 06-42)
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N85-15215# Joint Publications Research Service, Arlington, Va.
SPECTRUM OF GEOMAGNETIC FIELD VARIATIONS IN THE RANGE OF PERIODS BETWEEN 1 AND 10 YEARS Abstract Only
Yu. R. Rivin *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 101-102 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 269-273 (For primary document see N85-15196 06-42)
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N85-15217# Joint Publications Research Service, Arlington, Va.
STRESSES AND STRAINS IN LITHOSPHERE CAUSED BY EARTH'S THERMOCONVECTIVE OSCILLATIONS Abstract Only
B. I. Birger and S. M. Kovtunenko *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 117-118 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (Moscow), no. 3, Mar. 1984 p 3-20 (For primary document see N85-15196 06-42)
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N85-15218# Joint Publications Research Service, Arlington, Va.
CHEMICAL KINETICS AND EARTH'S ATMOSPHERE Abstract Only
V. L. Talroze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 126 Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 3, Mar. 1984 p 95-105 (For primary document see N85-15196 06-42)
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N85-15219# Joint Publications Research Service, Arlington, Va.
PROCESSES OF SMOOTH INCREASE AND DROPOFF IN INTENSITY OF GLOW LINE LAMBDA' = 5577 A WITH EXPOSURE OF IONOSPHERE TO ELECTRON BEAM Abstract Only
T. G. Adeyshvili and G. G. Managadze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 127 Transl. into ENGLISH from Soobshch. Akad. Nauk Gruzinsk. SSR (Tbilisi), v. 111, no. 1, Jul. 1983 p 61-64 (For primary document see N85-15196 06-42)
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N85-15221# Joint Publications Research Service, Arlington, Va.
OBSERVATION OF NATURAL NOISE NEAR UPPER HYBRID RESONANCE IN TERRESTRIAL MAGNETOSPHERE BY PROGNOZ-5 SATELLITE Abstract Only
G. M. Artemyeva, V. P. Grigoryeva, V. N. Ivanov, V. V. Pisareva, A. F. Tarasov, I. F. Feklicheva, and V. I. Shavshina *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 128 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 249-253 (For primary document see N85-15196 06-42)
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N85-15222# Joint Publications Research Service, Arlington, Va.
DISTRIBUTION OF ELECTRIC FIELD NEAR WESTWARD PROPAGATING BEND IN AURORA Abstract Only
V. G. Petrov, T. V. Kozelova, L. L. Lazutin, and Zh.-P. Treyyu *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 129 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 232-236 Original language document was announced in IAA as A84-31962 (For primary document see N85-15196 06-42)
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N85-15223# Joint Publications Research Service, Arlington, Va.
LONGITUDINAL CURRENT BEFORE WESTWARD PROPAGATING AURORAL BEND Abstract Only
T. V. Kozelova and V. B. Lyatskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 129-130 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 228-231 (For primary document see N85-15196 06-42)
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N85-15228# Joint Publications Research Service, Arlington, Va.
POSSIBLE EFFECTS OF INTERACTION OF ELECTRIC SEISMIC FIELDS WITH THE IONOSPHERE Abstract Only
M. B. Gokhberg, N. I. Gershenzon, I. L. Gufeld, A. V. Kustov, and V. A. Liperovskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 136 Transl. into ENGLISH from Geomagetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 217-222 Original language document was announced in IAA as A84-31959 (For primary document see N85-15196 06-42)
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N85-15232# Joint Publications Research Service, Arlington, Va.
FINE STRUCTURE OF ALFVEN MASER RADIATION Abstract Only
P. P. Belyayev, S. V. Polyakov, V. O. Rapoport, and V. Yu. Trakhtengerts *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 138 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 242-248 (For primary document see N85-15196 06-42)
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N85-15234# Joint Publications Research Service, Arlington, Va.
LIMITS OF APPLICABILITY OF LONG WAVE THEORY IN STUDIES OF OSCILLATIONS OF n-LAYER FLUID Abstract Only
M. V. Babiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 14. Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 329-332 (For primary document see N85-15196 06-42)
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N85-15235# Joint Publications Research Service, Arlington, Va.
CHARACTERISTIC SCALE OF INNER MIXING LAYERS IN STABLY STRATIFIED ATMOSPHERE Abstract Only
M. V. Kurganskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 140 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 237-241 (For primary document see N85-15196 06-42)
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N85-15236# Joint Publications Research Service, Arlington, Va.
INTERNAL GRAVITY WAVES IN REAL ATMOSPHERE Abstract Only
O. V. Kaydalov and t. V. Solovyeva *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 141 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 255-261 (For primary document see N85-15196 06-42)
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N85-15237# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF REFRACTION EFFECTS ON INFORMATIVENESS OF BISTATIC ACOUSTICAL ATMOSPHERIC SOUNDING SYSTEMS Abstract Only
A. Ya. Bogushevich and N. P. Krasnenko *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 141 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 262-268 Original language document was announced in IAA as A84-34443 (For primary

document see N85-15196 06-42)
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N85-15240# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF IONIZATION SOURCES IN D REGION BASED ON THEORETICAL MODELS Abstract Only
M. N. Vlasov and V. V. Medvedev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 143 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 187-190 Original language document was announced in IAA as A84-31953 (For primary document see N85-15196 06-42)
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N85-15241# Joint Publications Research Service, Arlington, Va.
MEDIUM- AND LARGE-SCALE WAVE DISTURBANCES AND HETEROGENEITIES OF ELECTRON CONCENTRATION IN OUTER IONOSPHERE IN MIDDLE AND LOW LATITUDES Abstract Only
M. N. Fatkullin, G. K. Solodovnikov, and A. D. Legenka *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 143 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 191-195 Original language document was announced in IAA as A84-31954 (For primary document see N85-15196 06-42)
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N85-15242# Joint Publications Research Service, Arlington, Va.
MODELING INFLUENCE OF THREE LAYER CLOUD COVER ON OUTGOING THERMAL RADIATION Abstract Only
I. M. Gracheva and I. I. Mokhov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 144 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 242-249 Original language document was announced in IAA as A84-34440 (For primary document see N85-15196 06-42)
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N85-15641*# Chicago Univ., Ill.
WHERE IS THE EARTH'S MISSING XENON? Abstract only
John F. Wacker and Edward Anders *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 08G

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N85-15319*# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
ELECTROMAGNETIC RESONANCES OF CYLINDERS AND AIRCRAFT MODEL WITH RESISTIVE WIRES
G. W. Wood and T. F. Trost Nov. 1984 59 p refs
(Grant NAG1-28)
(NASA-CR-174203; NAS 1.26:174203) Avail: NTIS HC A04/MF A01 CSCL 04B

The natural frequencies of the electromagnetic resonances of conducting bodies with attached wires were determined. The bodies included twp cylinders and an approximate scale model of the NASA F-106B aircraft. All were three feet in length. Time domain waveforms of B-dot and D-dot were obtained from a sampling oscilloscope, and Prony analysis was used to extract the natural frequencies. The first four natural frequencies of the cylinders (and wires) were determined, and a comparison with calculated results of other investigators shows reasonable agreement. Seven natural frequencies were determined for the F-106B model (with wires), and these were compared with results obtained by NASA in 1982 during direct lightning strikes to the aircraft. The agreement between the corresponding natural frequencies of the model and the aircraft is fairly good and is better than that obtained in the previous work using wires with less resistance. The frequencies lie between 6.5 MHz and 41 MHz, and all of the normalized damping rates are between 0.14 and 0.27. R.S.F.

N85-15320*# National Oceanic and Atmospheric Administration, Washington, D. C. Regional and Mesoscale Meteorology Branch.
CONVECTIVE SCALE WEATHER ANALYSIS AND FORECASTING
James F. W. Purdom [1984] 23 p refs Prepared in cooperation with Colorado State Univ.
(Grant NAGw-504)
(NASA-CR-174185; NAS 1.26:174185) Avail: NTIS HC A02/MF A01 CSCL 04B

How satellite data can be used to improve insight into the mesoscale behavior of the atmosphere is demonstrated with emphasis on the GOES-VAS sounding and image data. This geostationary satellite has the unique ability to observe frequently the atmosphere (sounders) and its cloud cover (visible and infrared) from the synoptic scale down to the cloud scale. These uniformly calibrated data sets can be combined with conventional data to reveal many of the features important in mesoscale weather development and evolution. A.R.H.

N85-15321# Weapons Systems Research Lab., Salisbury (Australia).
ERROR ANALYSIS OF WIND DETERMINED USING A VLF OMEGA SONDE
K. H. Lloyd Defence Research Centre. Jun. 1984 40 p refs
(WSRL-0361-TM; AR-003-790) Avail: NTIS HC A03/MF A01

The atmospheric wind profile can be determined by tracking the drift of an ascending or descending sonde. Generally the sonde is tracked by radar, but, because of problems associated with radar, Omega navigation is now sometimes used as an alternative. The errors associated with determining the wind profile by using omega are discussed with particular emphasis on how the error is related to the rate of descent of the sonde. R.S.F.

N85-15322# Naval Postgraduate School, Monterey, Calif.
MONTHLY AND SEASONAL CLIMATOLOGY OVER THE GLOBAL TROPICS AND SUBTROPICS FOR THE DECADE 1973 TO 1983. VOLUME 1: 200 mb WINDS Technical Report, Aug. 1983 - Aug. 1984
J. S. Boyle and C. P. Chang Aug. 1984 177 p 2 Vol.
(Contract NOAA-NA-83-AAG-03828)
(AD-A146521; NPS63-84-006) Avail: NTIS HC A09/MF A01 CSCL 04/2

This atlas of the 200 mb circulation field contains northern winter monthly and seasonal mean wind analyses, velocity potential and streamfunction from 40S to 60N over a global belt for the decade 1973 through 1983. In addition, the deviations of the individual annual seasonal and monthly means from their respective ten year means are presented for the same variables. The basic wind data used are the operational Global Band Analyses (GBA) of the United States Navy's Fleet Numerical Oceanography Center (FNOC). The analyses exhibit many interesting features, interannual variations and may shed some light on the understanding of the El Nino/Southern Oscillation phenomena. GRA

N85-15323# Naval Ocean Systems Center, San Diego, Calif.
PRACTICAL APPLICATION OF IREPS (INTEGRATED REFRACTIVE EFFECTS PREDICTION SYSTEM) Interim Technical Report, Oct. 1983 - Apr. 1984
R. A. Paulus 29 Jun. 1984 71 p
(AD-A146528; NOSC/TR-966) Avail: NTIS HC A04/MF A01 CSCL 04/2

The Integrated Refractive Effects Prediction System (IREPS) has been used operationally by the U.S. Navy since 1978. Subsequently, there have been questions from the fleet concerning IREPS assessments of system performance under strong (30-40 metres) evaporation ducting conditions that have not been borne out by observed system performance. Additionally, the IREPS climatological propagation assessments developed from the National Climatic Data Center data base show a distinctly bimodal distribution of evaporation duct heights that is difficult to justify. Errors in system performance assessment arise in three areas: (1) the environmental measurements, (2) the meteorological models

used to determine evaporation duct heights, and (3) the propagation models used to quantify propagation conditions. Only the first two of these areas are investigated in this report. The application of the IREPS evaporation duct model in assessing and the sensitivity of the model to meteorological measurements are examined. The unexpectedly high occurrence of evaporation duct height greater than 40 metres is related to stable conditions (positive air-sea temperature difference) in the surface layer. The existence of stable conditions over the ocean is analyzed in terms of meteorological conditions and temperature measurement accuracies. Comparisons of air-sea temperature difference distributions are made between high quality NOAA data buoy climatological data and archieved ship surface weather data. A modification to the evaporation duct model is proposed and applied to radio-meteorological data. GRA

N85-15324# Hydrologic Engineering Center, Davis, Calif.
PROBABLE MAXIMUM FLOOD ESTIMATION - EASTERN UNITED STATES
P. B. Ely and J. C. Peters Sep. 1984 15 p
(AD-A146536; HEC-TP-100) Avail: NTIS HC A02/MF A01 CSCL 08/8

In 1982, the National Weather Service (NWS) published criteria for developing the spatial and temporal precipitation distribution characteristics of Probable Maximum Storms. The criteria, which are intended for use in the United States east of the 105th meridian, involve four variables: (1) location of the storm center, (2) storm-area size, (3) storm orientation, and (4) temporal arrangement of precipitation amounts. A computer program has been developed which applies the NWS criteria to produce hyetographs of spatially-averaged precipitation for a basin, or for each subbasin if the basin is subdivided. The basis and operational characteristics of the program are described, and an application is illustrated in which the program is used in conjunction with a precipitation-runoff simulation program (HEC-1) to compute a Probable Maximum Flood. GRA

N85-15325# Washington Univ., Seattle. Dept. of Atmospheric Sciences.
SIMPLE MESOSCALE MODELS FOR OPERATIONAL USE IN REGIONS OF TOPOGRAPHIC AND THERMAL FORCING: DEVELOPMENT AND EVALUATION Final Report
C. F. Mass Jul. 1984 89 p
(Contract N00014-82-K-0674; DA Proj. W05-13)
(AD-A146667; NEPRF-CR-84-05) Avail: NTIS HC A05/MF A01 CSCL 04/2

A one-level numerical (Mass-Dempsey) model suitable for diagnosing mesoscale flow in regions of complex terrain and land/water interface is described. This model requires only modest computer resources and needs little data for initialization. Two other one-level models also are described and run with the Mass-Dempsey model for cases of the Pacific Northwest, San Francisco Bay Area, and Subic Bay, PI. Results suggest that the Mass-Dempsey model produces fairly good results and appears to be superior to the other models. It is also found, however, that the model requires too much computer resources for operational use on small computers. GRA

N85-15326# National Bureau of Standards, Washington, D.C. National Fenestration Council.
CORRELATIONS OF SOLAR IRRADIANCE AND DAYLIGHT ILLUMINANCE FOR BUILDING ENERGY ANALYSIS
Gary Gillette and Stephen Treado Oct. 1984 35 p refs
(Contract DE-AC05-84OR-21400)
(DE85-001736; ORNL/Sub-81-22201/2) Avail: NTIS HC A03/MF A01

The concept of luminous efficacy, the ratio of daylight illuminance to solar irradiance, is investigated for use in building energy analyses. Horizontal and vertical luminous efficacies are evaluated as functions of solar altitude, cloud condition, atmospheric extinction coefficient, turbidity, and season. Based on sky measurements made at the National Bureau of Standards, values of luminous efficacy for total, diffuse, and direct beam radiation are presented. DOE

N85-15327# Department of Energy, Washington, D. C. Office of Basic Energy Sciences.
CARBON DIOXIDE AND CLIMATE: SUMMARIES OF RESEARCH IN FY 1983 AND FY 1984
Sep. 1984 129 p
(DE85-001245; DOE/ER-0202) Avail: NTIS HC A07/MF A01

The activities and products of the Carbon Dioxide Research Program in fiscal years 1983 and 1984 are documented. Summaries are divided into research areas as follows: carbon cycle; climate and first detection; vegetation response, indirect effects and modification, adaptation, and prevention; scientific interface; and integration and evaluation. DOE

N85-15328# California Univ., Livermore. Lawrence Livermore Lab.
STATISTICAL RELATIONSHIPS BETWEEN METEOROLOGICAL DATA STATIONS AND IMPLICATIONS TO DIAGNOSTIC MODELS IN COMPLEX TERRAIN
W. M. Porch, R. Lange, and D. E. Bennett Jun. 1984 6 p refs Presented at the 3rd American Meteorological Society Conf. on Mountain Meteorol., Portland, Oreg., 15 Oct. 1984
(Contract W-7405-eng-48)
(DE84-014380; UCRL-90679) Avail: NTIS HC A02/MF A01

Wind speed and direction measurements taken during field experiments at the Geyser region in northern California were analyzed and characterized for data quality control, representativity, model verification, and improved interpolation. DOE

N85-15329# Los Alamos Scientific Lab., N. Mex.
TOWING TANK STUDIES OF STRATIFIED FLOW OVER RIDGES AND VALLEYS
J. T. Lee, Sumner Barr, Robert E. Lawson, Jr. (EPA), William H. Snyder (EPA), and G. L. Marsh (Northrop Services, Inc.) 1984 34 p refs Presented at the American Meteorological Society 3rd Conf. on Mountain Meteorol., Portland, Oreg., 15-19 Oct. 1984
(Contract W-7405-eng-36)
(DE84-011418; LA-UR-84-1314; CONF-841059-1) Avail: NTIS HC A03/MF A01

Stable atmospheric flow over a ridge and a valley was simulated in a large towing tank filled with stratified salt water. Flow visualization experiments were conducted using colored dye streamers and 10 cm high models with sinusoidal cross sections. These experiments provided qualitative data on the structure of the flow field over the ridges and within the valley. They also provided quantitative data on the height of the dividing streamline which separates the fluid that flows over a ridge from that which flows around the ends. These data agree with an existing theory based upon the potential energy barrier associated with flow over the ridge. DOE

N85-15330# National Severe Storms Lab., Norman, Okla.
SPRING PROGRAM SUMMARY, 1983
J. T. Dooley, ed. Apr. 1984 66 p
(PB84-222223; NOAA-TM-ERL-NSSL-96; NOAA-84071101) Avail: NTIS HC 04/MF A01 CSCL 04B

The National Severe Storms Laboratory (NSSL) is involved both with the collection of data and its analysis. Principal objectives of the 1983 observation program were to: (1) acquire a dual Doppler data set from a tornadic and/or supercell status storm, (2) increase the data base of the Storm Electricity Group, (3) support other groups in experiments related to the electric field inside and around thunderstorms, (4) measure the structure of wind and reflectivity in clear air, (5) measure gust gradients in adverse meteorological conditions with special emphasis on airport approach and departure flight paths, (6) obtain tornado proximity data with the Totable Tornado Observatory (TOTO) and (7) measurement of parameters related to the boundary layer. GRA

N85-15331# National Hurricane Center, Coral Gables, Fla.
FREQUENCY AND MOTION OF WESTERN NORTH PACIFIC

TROPICAL CYCLONES
Z. Xue (Shanghai Typhoon Inst., China) and C. J. Neumann May 1984 77 p refs
(PB85-106466/GAR; NOAA-TM-NWS-NHC-23) Avail: NTIS HC A05/MF A01 CSCL 04B

A statistical analysis of Western North Pacific tropical storms and typhoons over the 37-year period, 1946 to 1982 is presented. Emphasis is on frequency and motion characteristics. GRA

N85-15332# National Weather Service, Kansas City, Mo.
STANDARD SHEF (STANDARD HYDROMETEOROLOGIC EXCHANGE FORMAT) DECODER VERSION 1.1
G. M. Bonnin Aug. 1984 103 p refs
(PB85-106508/GAR; NOAA-TM-NWS-CR-72) Avail: NTIS HC A06/MF A01 CSCL 04B

Standard Hydrometeorologic Exchange Format (SHEF) (4) has been in use since early 1983. It has been implemented in a number of different programs and is gaining wide acceptance. At a meeting of National Weather Service Regional SHEF Focal Points held in Cincinnati (November 1983), a number of proposals were formally presented and accepted (3,5). At the time of the initial release of SHEF, a computer program (PARSHEF) was released. This program served as an automatic decoder of SHEF. PARSHEF has been described (2) as well as its use in the process of decoding and posting SHEF encoded data to a database (1). The purpose of this paper is to set forth those changes to PARSHEF which bring it to Version 1.1, and it should be read in conjunction with references 2 and 4. Author (GRA)

N85-15333# Environmental Sciences Research Lab., Research Triangle Park, N.C.
DIURNAL AND SEASONAL PATTERNS OF TEMPERATURE AND WIND FLOW IN THE PLANETARY BOUNDARY LAYER FOR TEN LOCATIONS IN COMPLEX TERRAIN
L. E. Truppi Oct. 1984 15 p refs
(PB85-106698/GAR; EPA-600/D-84-248) Avail: NTIS HC A02/MF A01 CSCL 04B

In support of the Complex Terrain Model Development program, climatological summaries in the form of vertical profiles of wind and temperature were produced from a special computer file of radiosonde data created from twice daily observations recorded at ten National Weather Service stations located in the Rocky Mountain and Great Basin regions of the United States. Seasonal and diurnal patterns were presented showing terrain influence at each radiosonde location characteristics of early morning and late afternoon conditions. Although climatological patterns were related to the particular valley-ride topography of the radiosonde site, terrain influence can be estimated at nearby site where data are required for studies of the planetary boundary layer, as in atmospheric dispersion modeling. GRA

N85-15334# National Oceanic and Atmospheric Administration, Washington, D. C.
MARINERS WEATHER LOG, VOLUME 28, NO. 3, JULY-AUGUST-SEPTEMBER 1984
Sep. 1984 74 p
(PB85-107266) Avail: NTIS HC A04/MF A01 CSCL 04B

The report describes weather observations for marine areas. Articles included are: Comparison between Ship and Buoy Climatologies; Great Lakes Navigation Season, 183; Marine Observation Program; Tips to the Radio Officer; and Marine Weather Review. GRA

N85-15335# National Weather Service, Silver Spring, Md. Techniques Development Lab.
TRENDS IN SKILL AND ACCURACY OF NATIONAL WEATHER SERVICE POP FORECASTS
Harry R. Glahn Jul. 1984 42 p refs
(PB84-229053; NOAA/TM-NWS-TDL-73; NOAA-84073001) Avail: NTIS HC A03/MF A01 CSCL 04B

Ramage (1982) in his paper Have Precipitation Forecasts Improved. analyzed 12 years of National Weather Service forecasts and concluded, After the contribution of relative precipitation frequency was removed, accuracy improvement, amounting to about 1% in seven years could be detected only in the eastern and central region winter forecasts. This paper reports on a study undertaken to better understand Ramage's conclusions and to see whether they would hold over a longer period of record. This report is based not only on the 12 years of data used by Ramage but also on 4 additional years. The scores used are percent correct, Brier score, and skill score. There is only weak evidence of an improving trend in the 12-yr summer sample. However, there is strong evidence for an improving national trend in the 12-yr winter sample. Also, there is very strong evidence that the probability of precipitation forecasts improved over the longer period of record-1967-1982. GRA

N85-15336# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
ENVIRONMENTAL RESEARCH LABORATORIES (OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION) PROGRAMS AND PLANS: FY 1983 PROGRAMS AND FY 1984 PLANS
Dec. 1983 223 p
(PB84-226729; NOAA-84072601) Avail: NTIS HC A10/MF A01 CSCL 04B

The Environmental Research Laboratories (ERL) are organized within NOAA's Research and Development arm and have their headquarters in Boulder, Colo. The ERL program is a broad one, embracing studies relating to the oceans and Great Lakes, the lower and upper atmosphere, and the solar-terrestrial environment. Studies and activities have focus in eight subject areas: Weather observation and prediction; Cloud physics research and technology development; Air quality research and technology development; Climate research; Solar-terrestrial research and services; Marine observation and prediction; Marine assessment research and services; Marine resources research and services. GRA

N85-15337# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
PRECIPITATION CHARACTERISTICS OF A DUAL MESOSCALE CONVECTIVE COMPLEX
A. A. Rockwood, D. L. Bartels, and R. A. Maddox Apr. 1984 56 p refs
(PB84-226711; NOAA-TM-ERL-ESG-6; NOAA-84072501) Avail: NTIS HC A04/MF A01 CSCL 04B

Flash flooding resulted from two Mesoscale Convective Complexes (MCCs, 1980) that formed nearly simultaneously and traversed roughly the same geographical area. In addition to heavy rains, hail damage and strong winds occurred. The precipitation characteristics, internal structure, and evolution of the dual MCC are presented using hourly surface mesoanalyses, WSR-57 radar composites and enhanced IR satellite imagery. The analyses suggest that certain features are similar to both tropical squall line systems and middle-latitude squall lines. The MCCs considered here are very complex and distinctly three dimensional. Time-lapse radar film revealed an intense mesobeta-scale circulation embedded in the second MCC. Extremely heavy rains and damaging winds are associated with this feature. Author (GRA)

N85-15338# National Weather Service, Silver Spring, Md. Techniques Development Lab.
AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) DISPLAY OF MDR (MANUALLY DIGITIZED RADAR) DATA ON LOCAL MAP BACKGROUNDS
M. C. Newton Jul. 1984 32 p refs
(PB84-220797; NOAA-84071902; NOAA/NWS-TDL-CP-84-1) Avail: NTIS HC A03/MF A01 CSCL 04B

An AFOS applications computer program described by this document will, upon forecaster initiation, produce an AFOS display of MDR data on detailed local area map backgrounds. The program will create two graphics each time it is run. One of the graphics consists of an array of MDR digits with each digit representing a single hour's MDR value for the grid square where it appears. The number of hours that will be plotted is determined by the user when the program is initiated. A maximum of 6 hours is

allowed. A second graphic will depict the summed MDR values for each grid square for the selected number of hours. A 1-h selection will only produce one graphic. Either of the two graphics may then be overlayed on a local map background. GRA

N85-15197# Joint Publications Research Service, Arlington, Va.
PALEOCLIMATOLOGISTS USE PAST TO PREDICT WEATHER PATTERNS
Alexander Viktorov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 1-2 Transl. into ENGLISH from Nedelya (Moscow), no. 19, 7-13 May 1984 p 15 (For primary document see N85-15196 06-42)
Avail: NTIS HC A08

N85-15198# Joint Publications Research Service, Arlington, Va.
INTERNATIONAL CONFERENCE ON PHYSICS OF CLOUDS Abstract Only
In its USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 4 Transl. into ENGLISH from Kazahstansk. Pravda (Alma-Ata), 29 Aug. 1984 p 3 (For primary document see N85-15196 06-42)
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N85-15199# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF TEMPERATURE FIELD BASED ON OBSERVATIONS OF REFRACTION FROM HIGH METEOROLOGICAL MAST Abstract Only
S. P. Beschastnov, G. M. Grechko, A. S. Gurvich, S. V. Zagoryuko, V. Kan, and V. V. Finke *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 6 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 231-236 Original language document was announced in IAA as A84-34438 (For primary document see N85-15196 06-42)
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N85-15226# Joint Publications Research Service, Arlington, Va.
SIMPLE FORMULA TO ESTIMATE CARBON DIOXIDE GAS EFFECT IN RADIATION BALANCE OF UNDERLYING SURFACE Abstract Only
Zh. K. Zolotova and K. S. Shifrin *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 134-135 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 321-323 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15229# Joint Publications Research Service, Arlington, Va.
LIDAR MEASUREMENTS OF STRUCTURAL CHARACTERISTICS OF ATMOSPHERIC TURBULENCE Abstract Only
M. S. Belenkiy, A. A. Makarov, V. L. Mironov, and V. V. Pokasov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 137 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, apr. 1984 p 314-317 Original language document was announced in IAA as A84-34448 (For primary document see N85-15196 06-42)
Avail: NTIS HC A08

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N85-15339# Nevada Univ., Reno. Desert Research Inst.
STUDIES OF THE OCEAN SURFACE AND THE COUPLING BETWEEN THE SEA AND THE ATMOSPHERE Final Report, 1 Sep. 1974 - 31 Mar. 1984
J. W. Telford 1 Oct. 1984 69 p
(Contract N00014-75-C-0598)
(AD-A146546) Avail: NTIS HC A04/MF A01 CSCL 04/2

Studies of the electric field above fog and the construction of a unique electric field mill are described. Work on the formation of fog includes the studies of the surface roughness, von Karman's constant, stratus formation in the convecting marine boundary layer and studies of how convection is initiated and continues in the marine boundary layer when the water is initially colder than the air. These results show why fog is more prevalent over colder water and why fog frequently forms in ocean areas adjacent to deserts. GRA

N85-15340# Science Applications, Inc., McLean, Va.
SIGMA CODE TESTING Final Report, Mar. 1984 - Mar. 1984
J. L. Seftor and G. O. Roberts 28 Mar. 1984 168 p
(Contract N00014-83-C-0289)
(AD-A146548; SAI-84/1073) Avail: NTIS HC A08/MF A01 CSCL 08/10

The SAI/NORDA Sigma Coordinate Ocean Forecasting computer code is a complicated simulation tool for modelling the behavior of the world's oceans. In this report, we present the result of a set of tasks which increase the code's accuracy and usefulness as a simulation tool. These tasks include the implementation of open boundary conditions, the creation of initialization data from mixed data sets, the improvement of output options, and the installation of the code on the VAX supermini computer. We also present the results of preliminary set up tasks for a simulation of the semiclosed basin of the eastern Mediterranean. GRA

N85-15341# Colorado Univ., Boulder. Cooperative Inst. for Research in Environmental Science.
SURGING AS A POTENTIAL RESPONSE OF ICE SHEETS TO CO2-INDUCED CHANGES IN THE POLAR ENVIRONMENT (SPICAE) Progress Report, 1 Jan. - 31 Aug. 1984
Uwe Radok Aug. 1984 21 p refs
(Contract DE-AC02-84ER-60197)
(DE84-016472; DOE/ER-60197/1) Avail: NTIS HC A02/MF A01

Project SPICAE which has two major parts, concerned with basic and surging dynamics of ice sheets is reported. Important physical characteristics were estimated or the West Antarctic Ross Ice Shelf Basin (WARISB), and it is assumed that it is in steady state balance. Flowlines were calculated for a cross section through West Antarctica to establish the equilibrium states of two major ice streams for their current mass balances and for drastically altered regimes. Surging dynamics were investigated which involved the delineation of parameter regions in the Budd-McInnes model which correspond to cyclic surging and steady state fast sliding of the two ice streams. DOE

N85-15342# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
TWO-DIMENSIONAL LAKE WAVE PREDICTION SYSTEM
David J. Schwab, John R. Bennett, and Edward W. Lynn May 1984 77 p refs
(PB84-231034; NOAA-TM-ERL-GLERL-51; NOAA-84080602) Avail: NTIS HC A05/MF A01 CSCL 08C

A series of computer programs that can be used to forecast wave height, period, and direction for any part of the Great Lakes is described. The programs only require the user to specify the overlake wind forecast. Author (GRA)

N85-15343# National Ocean Survey, Rockville, Md.
TIDE TABLES 1985. HIGH AND LOW WATER PREDICTIONS: EUROPE AND WEST COAST OF AFRICA INCLUDING THE MEDITERRANEAN SEA
1984 214 p
(PB84-230093; NOAA-84080605) Avail: NTIS HC A10/MF A01 CSCL 08C

Tide tables for Europe and West Coast of Africa contain full daily predictions for 37 reference stations and differences and ranges for about 1,000 stations. A table is given for obtaining the approximate height of the tide at any time. Also included are a table of local mean time of sunrise and sunset for every 5th day of the year for different lattitudes; a table for the reduction of local mean time to standard time; a table for converting feat to meters; a table of the Greenwich mean time of the Moon's phases, apogee, perigee, greatest north and south and zero declination,

and the time of the solar equinoxes and solstices; and a glossary of terms. GRA

N85-15344# Woods Hole Oceanographic Institution, Mass. Coastal Research Center.
DYNAMIC RESPONSE OF ELECTROMAGNETIC CURRENT METERS
David G. Aubrey, Wayne D. Spencer, and John H. Trowbridge (Delaware Univ., Newark) Jun. 1984 158 p refs
(Contract DACW2-82-C-00014; Grant NA80AA-D-0077)
(PB84-229731; WHOI-84/20; CRC-84/3; NOAA-84080603) Avail: NTIS HC A08/MF A01 CSCL 08C

The dynamic response of electromagnetic current meters (manufactured by Marsh-McBirney, Inc.) has been clarified through a comprehensive laboratory measurement program combined with a thorough literature review. Since flow past a spherical body has considerable hydrodynamic complexity for different dynamic conditions, a careful laboratory study was carried out for pure steady, pure oscillatory (horizontal plane), and combined steady/oscillatory conditions at two test facilities. Test results indicate that flowmeter behavior under pure steady flow is excellent in the absence of high levels of free-stream turbulence, with an r.m.s. error of 1-5 cm/sec. These studies pointed out a potential difficulty in using these meters in areas of large ambient turbulence levels (20% turbulent intensities), which are characteristic of many near-bottom shallow water environments. Author (GRA)

N85-15345# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
SPECTRAL MODEL FOR SUBTIDAL VARIABILITY IN THE CHESAPEAKE BAY Final Report
Peter Olson Mar. 1984 64 p refs Sponsored by Maryland Dept. of Natural Resources
(PB84-226679; PPSP/PPRP-89) Avail: NTIS HC A04/MF A01 CSCL 08C

The advent of long, continuous time series records of circulation in Chesapeake Bay revealed the existence of large amplitude fluctuations with the subtidal range 0.03 to 0.6 cycles per day. These fluctuations represent direct and indirect response of the estuary to variations in wind stress, fresh water inflow, and coastal sea level. A quantitative model is presented to explain this variability within the main stem of Chesapeake Bay in terms of a linear response to irregular, time varying meteorological forcing. The model calculates transfer functions and energy spectra of laterally averaged transport, surface elevation, and salinity in two layers separated by a halocline, over the frequency band 0.03 to 0.6 cpd. It is found that the observed volume transport spectrum at the mouth of the Bay can be explained quantitatively as the combined response to statistically independent wind stress and sea level fluctuations. GRA

N85-15346# Washington Univ., Seattle. School of Oceanography.
TIDES AND TIDAL CURRENTS OF THE INLAND WATERS OF WESTERN WASHINGTON
H. O. Mofjeld and L. H. Larsen Jun. 1984 66 p refs Sponsored by NOAA
(PB84-237379; NOAA/TM-ERL-PMEL-56; NOAA-84082002) Avail: NTIS HC A04/MF A01 CSCL 08C

The tides enter the inland waters of western Washington from the Pacific Ocean forming a pattern of nearly standing waves with large areas of relatively constant amplitude and phase separated by channels where both change rapidly. The tides are either mixed-semidiurnal. Usually the tides have nearly equal high waters with large differences in the low waters. The diurnal range decreases from 2.4 m at the western end (Neah Bay) of the Strait of Juan de Fuca to a minimum of 1.9 m at the southern end of Vancouver Island (Victoria, British Columbia) and then increases to 4.4 m at the southern end of Puget Sound (Olympia). There is an increase in phase lag away from the ocean due to tidal dissipation. This dissipation is large compared with inland waters with smooth bottom topography and is concentrated in the rugged channels such as Admiralty Inlet and Haro Strait with strong tidal currents. The tidal currents often exceed 1m/s in many channels and the Strait of Juan de Fuca. GRA

N85-15200# Joint Publications Research Service, Arlington, Va.
MANGANESE IN RECENT SEDIMENTS OF UKRAINIAN SSR BLACK SEA SHELF
V. I. Ogorodnikov and K. S. Krasovskiy *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 8-13 refs Transl. into ENGLISH from Dokl. Akad. Nauk Ukr. SSR, Ser. B: Geol., Khim i Biol. Nauki (Kiev), no. 6, Jun. 1984 p 18-21 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15201# Joint Publications Research Service, Arlington, Va.
INTERNAL WAVES IN OCEAN
A. D. Yampolskiy, G. Ye. Kononkova, and K. V. Pokazeyev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 13-20 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1984 p 40-44 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15202# Joint Publications Research Service, Arlington, Va.
UNSINKABILITY OF FERROMANGANESE NODULES
In its USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 28-29 Transl into ENGLISH from Priroda (Moscow), no. 3, Mar. 1984 p 1.2-113 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15204# Joint Publications Research Service, Arlington, Va.
ENERGY ACTIVE AREAS OF OCEAN Abstract Only
S. S. Lappo, S. K. Gulev, A. P. Metalnikov, A. P. Rozhdestvenskiy, A. Ye. Sokolov, V. A. Volkova, G. P. Kopeykina, T. N. Reva, Yu. A. Tikhonov, and M. V. Senenov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 49 Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 275, no. 4, Apr. 1984 p 1018-1021 (For primary document see N85-15196 06-42)
Avail: NTIS HC A08

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N85-15347*# National Aeronautics and Space Administration, Washington, D. C.
STRUCTURE AND FUNCTIONS OF FUNGAL CELL SURFACES
Y. Nozawa Apr. 1984 23 p refs Transl. into ENGLISH from Shinkin to Shinkinsho (Japan), v. 18, no. 3, 1977 p 147-155 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77439; NAS 1.15:77439) Avail: NTIS HC A02/MF A01 CSCL 06C

A review with 24 references on the biochemistry, molecular structure, and function of cell surfaces of fungi, especially dermatophytes: the chemistry and structure of the cell wall, the effect of polyene antibiotics on the morphology and function of cytoplasmic membranes, and the chemical structure and function of pigments produced by various fungi are discussed. Author

N85-15348*# National Aeronautics and Space Administration, Washington, D. C.
THE STRUCTURE AND FUNCTION OF FUNGAL CELLS
Y. Nozawa Apr. 1984 22 p refs Transl. into ENGLISH from Shinkin to Shinkinsho (Japan), v. 18, no. 4, 1977 p 270-278 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77443; NAS 1.15:77443) Avail: NTIS HC A02/MF A01 CSCL 06C

The structure and function of fungal cell walls were studied with particular emphasis on dermatophytes. Extraction, isolation, analysis, and observation of the cell wall structure and function

were performed. The structure is described microscopically and chemically. Author

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N85-15349*# Marquette Univ., Milwaukee, Wis. Dept. of Biology.
ALTERATIONS IN SKELETAL MUSCLE WITH DISUSE ATROPHY Annual Report
Robert H. Fitts [1984] 4 p
(Grant NAG2-212)
(NASA-CR-174195; NAS 1.26:174195) Avail: NTIS HC A02/MF A01 CSCL 06P

Progress is reported in the following areas: (1) microgel electrophoresis identification of single fibers; (2) skinned fiber preparation; and (3) microbiochemical techniques for assaying important enzymes and substrates in single fibers. A.R.H.

N85-15350# California Univ., Irvine, Dayton, Ohio.
PROCEEDINGS OF THE 14TH CONFERENCE ON ENVIRONMENTAL TOXICOLOGY
J. D. MacEwen, E. H. Vernot, and Mildred Pinkerton, ed. Wright-Patterson AFB, Ohio AF Medical Research Lab. Aug. 1984 339 p Proc. held at Dayton, Ohio, 15-17 Nov. 1983 Sponsored in part by Navy
(Contract F33615-80-C-0512)
(AD-A146400; AFAMRL-TR-83-099) Avail: NTIS HC A15/MF A01 CSCL 06/20

Papers were presented covering molecular mechanisms of n-hexane neurotoxicity, metabolism of n-hexane and anatomical effects of neurotoxins. The pathological, metabolic, electrophysiological and biochemical characteristics of organophosphorus induced neurotoxicity were discussed in specific presentations. The male reproductive system as a target organ and specific problems associated with mixture toxicology were subjects of individual sessions. Occupational health data bases, early detection of environmental exposure and effects of exposure to Agent Orange were discussed in papers. For individual titles, see N85-15351 through N85-15369.

N85-15351# Albert Einstein Coll. of Medicine, New York. Inst. of Neurotoxicology.
NEUROTOXICOLOGY: A NEW SCIENTIFIC CHALLENGE
Peter S. Spencer *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 13-16 Sponsored in part by the Muscular Dystrophy Assoc., Amyotrophic Lateral Sclerosis Association of America, and Shell International Research (For primary document see N85-15350 06-52)
(Grants NIH-NS-19611; NIH-OH-00851; NIH-OH-00555)
(AD-P004017) Avail: NTIS HC A15/MF A01 CSCL 06/20

The science of neurotoxicology is in its infancy. The scale of the problem has been recognized, the scope of the discipline defined, and a preliminary classification of neurotoxic response developed. Some information is available on the relative frequency of neurotoxic response developed. Some information is available on the relative frequency of neurotoxic disease in developed and developing countries, and in which environmental or social niches these diseases occur. The challenge facing basic and clinical neurotoxicologists is to understand how these diseases develop and how they can be prevented. Since many neurotoxic conditions mimic naturally occurring neurological diseases, investigations designed to determine the biological actions of neurotoxic chemicals will undoubtedly illuminate other types of nervous-system compromise. Viewed from this perspective, the neurotoxic agent is not only a threat to human health, but also a powerful investigatory tool. GRA

N85-15352# Eastman Kodak Co., Rochester, N. Y. Health, Safety and Human Factors Lab.
REVIEW OF THE TOXICOKINETICS OF N-HEXANE
George D. DiVincenzo *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 17-24 (For primary document see N85-15350 06-52)
(AD-P004018) Avail: NTIS HC A15/MF A01 CSCL 06/20

N-Hexane is a volatile, lipophilic solvent that is readily absorbed by the pulmonary, oral, and dermal routes. It is rapidly excreted unchanged in expired air, and is excreted in urine in the form of metabolites. n-Hexane is metabolized by a complex pathway that leads to a variety of oxidation products, one of which is 2,5-hexanedione. The neurotoxicity of n-hexane is related to its metabolism to 2,5-hexanedione. n-Hexane is the least potent number of a series of neurotoxic hexacarbons. GRA

N85-15353# Albert Einstein Coll. of Medicine, New York. Dept. of Neurology.
INTERACTIONS OF KETONES AND HEXACARBONS
Bellina Veronesi (Northrup Services, Research Triangle Park, N.C.), Arthur W. Lingon (Exxon Corp., E. Millstone, N.J.), and Peter S. Spencer *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 25-39 (For primary document see N85-15350 06-52)
(Contracts CDC-OH-00535; CDC-OH-00851; Grant NSF PFR-78-812701)
(AD-P004019) Avail: NTIS HC A15/MF A01 CSCL 06/20

Methyl ethyl ketone appears to accelerate the onset and severity of the dying-back neuropathy produced by hexacarbons. The mechanism underlying this potentiation is unknown. It was our intention to replicate and investigate this interaction in tissue culture using organotypic explants of mouse spinal cord with attached dorsal root ganglia and striated muscle. At maturity, this complex displays morphological and bioelectrical features typical of mammalian neuromuscular tissues in vivo. This type of tissue culture has been used for many years in experimental neurobiology and neuropathology and is amenable to neurotoxicological inquiries. It has been especially valuable in addressing the pathogenic and metabolic events of subchronic exposure to aliphatic hexacarbons. GRA

N85-15354# New York State Dept. of Health, Albany.
MOLECULAR MECHANISMS OF N-HEXANE NEUROTOXICITY
Anthony P. DeCaprio (For primary document see N85-15350 06-52)
(AD-P004020) Avail: NTIS HC A15/MF A01 CSCL 06/20

A hypothetical molecular mechanism of action must ideally account for the structure/activity relationships, neurofilament accumulation, in vivo covalent protein binding, direct action on axonal components, and target organ specificity which are characteristic of the neuropathy caused by these compounds. Although this ideal has not yet been realized, substantial progress has been made toward elucidation of the crucial events leading to neuropathy. Ultimate success awaits exploration of the molecular interaction of the neurotoxic diketones with axonal components in vivo. The distinguishing features of n-hexane neuropathy are listed. GRA

N85-15355# Ohio State Univ., Columbus. Dept. of Neurology and Pathology.
PATHOLOGY AND AXONAL TRANSPORT IN HEXACARBON NEUROPATHIES
Z. Sahenk and J. R. Mendell *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 60-67 (For primary document see N85-15350 06-52)
(AD-P004021) Avail: NTIS HC A15/MF A01 CSCL 06/20

These studies lead us to propose the following hypothesis. The earliest change in the axon following hexacarbon exposure is an alteration in the cytoskeleton, resulting in clusters of microtubule channels segregated from neurofilaments. Initially, fast anterograde transport continues through these functioning channels. With continued exposure, the cytoskeleton becomes chaotic, and pathways for moving organelles are impaired, affecting both anterograde and retrograde transport. The severe disruption in axoplasmic transport seems to play a key role in axonal degeneration, at least in part related to the failure of delivery of important

materials to the distal axon. Furthermore, the accumulation of lysosomal material, carried by retrograde transport, may play a role in the initiation and/or acceleration of the intraaxonal digestive process which is part of nerve fiber degeneration. GRA

N85-15356# Stauffer Chemical Co., Farmington, Conn. Toxicology Dept.
ORGANOPHOSPHORUS-INDUCED DELAYED NEUROTOXICITY: SYNDROME AND EXPERIMENTAL MODELS
G. L. Sprague, A. A. Bickford, and T. R. Castles *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 69-75 (For primary document see N85-15350 06-52)
(AD-P004022) Avail: NTIS HC A15/MF A01 CSCL 06/20

This study was conducted to compare neurotoxicity in hens and rats produced by tri-o-cresyl phosphate (TOCP) delayed neurotoxicant. A metabolic inhibitor, piperonyl butoxide, was co-administered with TOCP in rats in an attempt to reduce their resistance to organophosphate-induced delayed neurotoxicity. GRA

N85-15357# American Cyanamid Co., Princeton, N.J. Agriculture Research Div.
CHEMISTRY AND METABOLISM OF DELAYED NEUROTOXIC ORGANOPHOSPHORUS ESTERS
J. Gary Hollingshaus *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 76-105 (For primary document see N85-15350 06-52)
(AD-P004023) Avail: NTIS HC A15/MF A01 CSCL 06/20

In general, correlations between organophosphorus ester-induced delayed neurotoxicity (OPIDN) in vivo and physical/chemical parameters or inhibition of NTE in vitro have not been totally satisfactory. Some correlations of OPIDN with leaving groups, length of O-alkyl chains, or the nature of the P-C group have been demonstrated, but such correlations only apply to closely related series of compounds where two of the substituents remain constant while the third is varied. Although the biochemical and physiologic functions of NTE are unknown, there are numerous satisfactory correlations between inhibitors of NTE in vitro and OPIDN in vivo. However, significant exceptions have been found which at present make it impossible to predict those structures most likely to produce OPIDN. GRA

N85-15358# Virginia Polytechnic Inst., Blacksburg. Coll. of Veterinary Medicine.
PATHOLOGY OF ORGANOPHOSPHORUS-INDUCED DELAYED NEUROTOXICITY
Bernard S. Jortner *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 106-117 (For primary document see N85-15350 06-52)
(AD-P004024) Avail: NTIS HC A15/MF A01 CSCL 06/20

Details of the nature and metabolic effects of the neurotoxic organophosphorus compounds, experimental protocols used, species susceptibility, and clinical disease produced in studies of delayed neuropathy are considered elsewhere in these proceedings. This presentation will emphasize the nature of associated nervous system lesions. To properly appreciate this, a brief note of clinical abnormalities is useful. Administration of an appropriate dose of a neurotoxic organophosphorus compound to a susceptible species produces clinical signs in about 1-3 weeks. In hens given tri-ortho-tolyl (or cresyl) phosphate (TOTP), an unsteady, clumsy gait began in about 8-10 days, and in association with ataxia, progressed to weakness and paralysis. Wings were affected later, and to a lesser degree. GRA

N85-15359# Parke-Davis Pharmaceutical Co., Ann Arbor, Mich.
ELECTROPHYSIOLOGIC CHANGES IN ORGANOPHOSPHORUS-INDUCED DELAYED NEUROTOXICITY
Rebecca J. Anderson *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 118-126 (For primary document see N85-15350 06-52)
(AD-P004025) Avail: NTIS HC A15/MF A01 CSCL 06/20

There is now a considerable body of literature showing that organophosphorus (OP) agents which produce organophosphorus-induced delayed neuropathy (OPIDN) also inhibit neurotoxic esterase (NTE). Although the functional relationship of these two events has not been established, the correlation is strong enough that NTE inhibition can be used as a reliable predictor of the peripheral neuropathy potency of a given agent (Johnson, 1975). There is a wealth of data describing the histopathology and biochemistry associated with OPIDN, but few electrophysiologic correlates have been made. GRA

N85-15360# Michigan Univ., Ann Arbor. Toxicology Research Lab.
BIOCHEMISTRY AND PATHOGENIC HYPOTHESES OF ORGANOPHOSPHORUS-INDUCED DELAYED NEUROTOXICITY
Bradley W. Schwab and Rudy J. Richardson *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 127-135 (For primary document see N85-15350 06-52)
(Grants NIH-ES-01611; NIH-ES-02770)
(AD-P004026) Avail: NTIS HC A15/MF A01 CSCL 06/20

This report will be a brief review of the investigations which provide data supportive of the hypothesis that a membrane-associated protein is the initial target of neurotoxic organophosphorous compounds (the term neurotoxic OP will be used in this paper to refer to organophosphorus compounds which produce delayed neuropathy). Findings from more recent studies will be used to develop a picture of the molecular state of the protein at the outset of the neurotoxic process. GRA

N85-15361# Johns Hopkins Univ., Baltimore, Md. School of Medicine.
CRITICAL OVERVIEW OF HEXACARBONS AND ORGANOPHOSPHATES
John W. Griffin *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 136-163 (For primary document see N85-15350 06-52)
(AD-P004027) Avail: NTIS HC A15/MF A01 CSCL 06/20

At the outset it seems worthwhile to compare and contrast the two groups of agents that have been discussed today - the neurotoxic hexacarbons and the delayed neurotoxicity of organophosphates. Dr. Spencer indicated that distal axonal degeneration is by far the most common pathologic manifestation of chemical neurotoxicity in general. The groups of agents under discussion both produce types of distal axonal degeneration. These agents have received extensive study, not only because of their public health implications, but as model systems for this type of neuropathology. In the last few years a wealth of basic toxicology, biochemistry, and data describing structure-function relationships has developed around both groups of agents. Parenthetically, it is difficult to overestimate the value of this broad research effort. GRA

N85-15362# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
PHARMACOKINETIC INTERACTIONS OF MIXTURES
Melvin E. Andersen and Harvey J. Clewell, III *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 226-238 (For primary document see N85-15350 06-52)
(AD-P004032) Avail: NTIS HC A15/MF A01 CSCL 06/20

This paper is divided into two sections. First, we describe several examples from the literature which indicate toxicologic or pharmacokinetic interactions arising during co-exposure to two vapors. Secondly, we discuss the metabolic basis of these interactions and try to generalize these results to illuminate the interactions that are expected during exposure to more complex mixtures. When possible, the examples in the second portion are given a quantitative basis by applying a physiological pharmacokinetic model to describe these interactions. GRA

N85-15363# California Univ., Irvine, Dayton, Ohio.
THE TOXICITY OF COMPLEX MIXTURES
H. N. MacFarland *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 239-245 (For primary document see N85-15350 06-52)
(AD-P004033) Avail: NTIS HC A15/MF A01 CSCL 06/20

In discussing the topic of the toxicity of complex mixtures, a definition of what we mean by complex is required. I shall consider any mixture of toxicants containing two or more components as complex. Statisticians have proposed various mathematical models to describe a number of types of toxicological action that mixtures may exhibit and I shall touch on these briefly. In addition, I will outline some studies on two component air pollutant mixtures and also another study with a mixture containing several hundred components to show how toxicologists, in fact, deal with these problems and to what extent they refer to these mathematical models in current practice. GRA

N85-15364# New Jersey Medical School, Newark. Dept. of Pharmacology.

TERATOGENICITY STUDIES OF CARBARYL AND MALATHION ALONE AND IN COMBINATION IN VARIOUS LABORATORY ANIMALS

M. S. Abdel-Rahman and D. W. Lechner *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 246-257 (For primary document see N85-15350 06-52)

(AD-P004034) Avail: NTIS HC A15/MF A01 CSCL 06/20

In the area of teratology, little has been studied concerning the interaction of chemicals, especially these two pesticides. This report will discuss in sufficient detail those aspects of teratogenicity and the mechanism which should allow for a better understanding of the toxic actions of these pesticides. GRA

N85-15365# Environmental Protection Agency, Cincinnati, Ohio. Toxicology and Microbiology Div.

TOXICOLOGY OF NATURAL AND MAN-MADE TOXICANTS IN DRINKING WATER

Richard J. Bull *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 259-266 (For primary document see N85-15350 06-52)

(AD-P004035) Avail: NTIS HC A15/MF A01 CSCL 06/20

There are the cases where one chemical actually reacts with a second chemical within the body to produce a more or less toxic group of chemicals. For the purposes of this paper, however, only reactions of chlorine to produce chemicals that possess carcinogenic and mutagenic properties will be considered. GRA

N85-15366# Ohio State Univ., Columbus. Dept. of Pharmacology.

ASPECTS OF SOLVENT TOXICITY IN MIXTURES

Abraham J. Tobia, Carl H. Miller, Jr., and Daniel Couri *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 267-283 (For primary document see N85-15350 06-52)

(AD-P004036) Avail: NTIS HC A15/MF A01 CSCL 06/20

In this presentation we will deal with chemicals produced in the United States in excess of 1 billion pounds per year. It is presumed that chemicals produced in such high volume would be those most likely to present health hazards under certain conditions of exposure. A recent EPA document, Perspectives on the Top Fifty Production Volume of Chemicals (July 1980), lists the Top 50 Chemicals. Although eleven of the top twelve are inorganic (elements, mineral acids and bases or salts), 31 of the 50 are organic, mostly monomers of plastics, rubbers or fibers; also fertilizers, antifreeze and intermediates. Xylene appears twice - once as mixed xylenes which is mostly meta and also as p-xylene, although toxic levels are not distinguished. GRA

N85-15367# School of Aerospace Medicine, Brooks AFB, Tex.

AN UPDATE ON THE CAPABILITIES OF THE AIR FORCE COMPUTERIZED OCCUPATIONAL HEALTH PROGRAM (COHP)

C. Donald Worthy, Jr. and Karen A. Meier *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 293-299 (For primary document see N85-15350 06-52)

(AD-P004037) Avail: NTIS HC A15/MF A01 CSCL 06/20

The Air Force has been conducting an aggressive occupational health program for over 30 years. The ultimate goal of the program is to protect the worker, both military and civilian, by providing a work environment that is free of recognized chemical, physical, or biological health risks. The success of the program has been and will be an essential contribution to our country's overall military readiness. GRA

N85-15368# School of Aerospace Medicine, Brooks AFB, Tex.

THE EPIDEMIOLOGY AND TOXICOLOGY OF AGENT ORANGE

William H. Wolfe *In* Calif. Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 300-306 (For primary document see N85-15350 06-52)

(AD-P004038) Avail: NTIS HC A15/MF A01 CSCL 06/20

An estimated 107 million pounds of herbicides were aerially-disseminated on three million acres in South Viet Nam from January 1962 through October 1971. Approximately 94 percent of all herbicides sprayed in Vietnam were 2,4-D (56 million pounds or 53 percent of total) or 2,4,5-T (44 million pounds or 41 percent of total). The 44 million pounds of 2,4,5-T contained an estimated 368 pounds of the toxic contaminant, 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD or dioxin). Currently, there are no epidemiologic data associating TCDD with any long-term health effects in humans other than intermittent Chloracne; however, while there is no evidence validating serious long-term health effects, neither is there strong evidence for lack of effect. GRA

N85-15369# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex.

EARLY DETECTION OF ENVIRONMENTAL EXPOSURE

Robert T. P. deTreville *In* California Univ., Irvine Proc. of the 14th Conf. on Environ. Toxicol. Aug. 1984 p 307-324 (For primary document see N85-15350 06-52)

(AD-P004039) Avail: NTIS HC A15/MF A01 CSCL 06/20

General methods of prevention in industrial hygiene are shown in Table 1 which shows the place of early detection of disease or excessive exposure. Early detection and/or exclusion of excessive exposure within a comprehensive program is usually much more cost effective than looking for early disease in an uncontrolled or inadequately controlled industrial environment. Table 2 lists some of the examples of screening approaches that have been used. Our diagnostic methods have advanced rapidly and there are much more sophisticated types of X-ray examinations and even CAT scanning that may be applicable in identifying whether chest disease has resulted from asbestos exposure. GRA

N85-15370# Naval Health Research Center, San Diego, Calif.

PREDICTION OF PERCENT BODY FAT FOR U.S. NAVY WOMEN FROM BODY CIRCUMFERENCES AND HEIGHT Interim Report

J. A. Hodgdon and M. B. Beckett Jun. 1984 6031 p

(AD-A146456; NAVHLTHRSCHC-84-29) Avail: NTIS HC A03/MF A01 CSCL 06/14

In October 1981, OPNAVINST 6110.1B was promulgated establishing the percentage of body weight contributed by fat mass (%BF) as the basis for weight control decisions. Tables based upon the work of Wright, et al. allowing prediction of %BF from neck, biceps, forearm, abdomen and thigh circumferences were accepted for use on an interim basis. This report covers validation of the equation of Wright and his co-workers, as well as development and cross-validation of a new equation which offers improved prediction of %BF for U.S. Navy female personnel. Anthropometric measures consisting of 8 skinfold thicknesses, 11 body circumferences, height, and body weight were made of 214 female U.S. Navy personnel aged 18-44 years (mean age - 26.5 years). In addition, each participant had her body density and %BF determined by underwater weighing. Validity of the Wright equation was assessed by correlation between predicted and measured %BF. The correlation coefficient - 0.80 (std. err. meas. = 4.19 %BF). Errors in prediction near the Navy minimum standard of 30% BF, dictated development of a new equation. Factor analysis of the anthropometric variables indicated a suitable equation could be developed using circumferences and height as predictors. An equation was developed using forward, stepwise multiple regression of logarithmic transforms of circumferences and height as predictors of body density determined from underwater weighing. The final equation was: Body Density = -0.350 x

log (ABDOMEN I + HIP - NECK) + 0.221 X log (HEIGHT) + 1.296. All measurements are expressed in centimeters. The multiple correlation coefficient for this equation was 0.85. GRA

N85-15371# Army Military Personnel Center, Alexandria, Va.
ELECTROPHYSIOLOGICAL CORRELATES OF VERNIER ACUITY IN HUMAN VISUAL CORTEX M.S. Thesis
R. Zak 28 Apr. 1984 98 p
(AD-A146533) Avail: NTIS HC A05/MF A01 CSCL 06/16

A three part evoked potential (EP) study was undertaken in an attempt to better understand the neural mechanisms underlying vernier acuity. Results indicated: (1) VEPs evoked by vernier offset stimuli could be used to estimate psychophysical threshold, (2) VEP amplitude was affected by interference lines in the same way as psychophysical sensitivity (3) origin of the VEPs (and the associated neural mechanism) may be outside of striate cortex. GRA

N85-15372# Brigham and Women's Hospital, Boston, Mass.
INTERACTION BETWEEN LUNG MECHANICS AND GAS EXCHANGE BY LOW VOLUME HIGH FREQUENCY PULMONARY VENTILATION IN PATIENTS WITH RESPIRATORY FAILURE Annual Summary Report, 1 Oct. 1982 - 30 Sep. 1983
J. M. Drazen, J. Lehr, A. F. Saari, J. Solway, and A. S. Slutsky 22 Nov. 1983 46 p
(Contract DAMD17-82-C-2210; DA Proj. 3M1-62734-A-875)
(AD-A146604) Avail: NTIS HC A03/MF A01 CSCL 06/16

Research progress has been made toward two goals in the first contract year, patient studies and model studies. In the patient studies we investigated the relationship between airway pressure and lung volume during high frequency low tidal volume ventilation (HFV). Patients requiring mechanical ventilatory support for treatment of respiratory insufficiency were studied by imposing rapid (1-10 Hz) oscillations with low tidal volumes (50-150 ml) at a constant mean airway pressure of 5 cm H2O. In the model studies the pressure drop during sinusoidal mean flows in a four generation network of rigid, uniform diameter, symmetrically branching tubes was studied. The data obtained were analyzed via a process of Fourier decomposition. The results showed that the pressure signals consist mainly of a dominant component at the excitation frequency (fundamental) and a first harmonic of smaller magnitude. We found the magnitude and phase of the fundamental to correlate closely with classical predictions as long as the parameter was less than 200. GRA

N85-15373# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
BLOOD PRESSURE LEVELS OF ACTIVE PILOTS COMPARED WITH THOSE OF AIR TRAFFIC CONTROLLERS
C. F. Booze, Jr. and L. S. Simcox Apr. 1984 14 p
(AD-A146645; FAA-AM-84-3) Avail: NTIS HC A02/MF A01 CSCL 06/5

Currently some 15,212 active airmen are certified to fly with a diagnosis of hypertension. Federal Aviation Administration blood pressure standards for certification of airmen for considered to be quite liberal; however, recent FAA policy further liberalized medications and dosages allowed in certification of airmen. Since limited information is available concerning the recorded blood pressures of airmen, a systematic sample of active pilots was extracted from automated medical files maintained by the Aeromedical Certification Branch of the Civil Aeromedical Institute for descriptive purposes as well as to compare with a sample of air traffic controllers, given the continuing interest in the relationship of stress of air traffic control work. This is a pre-strike ATCS sample. Distributions of blood pressure by age were compared by using conventional nonparametric techniques for 10-year age intervals. Data were also compared with general population findings. Prevalence of hypertension is greater in the general United States population than found with any of these groups reported. Prevalence of borderline and definite hypertension is seen to increase with age for all groups studied. Prevalence of any degree of hypertension is lower for airline pilots than the all-airmen group or the air traffic controller group. Of the three airmen groups, prevalence of hypertension is highest for the air traffic controllers, but the influence of more liberal waiver and retention criteria for air traffic controllers is an important reason for the excess. GRA

N85-15374# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
HUMAN REACTIONS TO TRANSIENT ELECTRIC CURRENTS, VOLUME 12 Annual Report, Jul. 1983 - Jun. 1984
J. Patrick Reilly, Willard Larkin, Linda B. Kittler, and V. T. Freeman Jul. 1984 130 p refs Sponsored in part by Maryland Dept. of Natural Resources, Annapolis 12 Vol.
(PB84-231463; JHU/APL-CPE-8313) Avail: NTIS HC A07/MF A01 CSCL 06T

The third year of a three year study of human reactions to transient electric currents is discussed. Stimuli represent those that may be encountered by induction in high strength dc or ac electric fields. These include individual capacitive discharges, and more complex stimuli applicable to ac field induction. Results are presented from a large sample of individuals. Statistical variations among individuals are presented. Factors which account for individual sensitivity differences are identified. Intersubject differences in the large population study are compared with individual variations in a longitudinal study. In other tests with a relatively few subjects, sensitivity dependences are reported for changes in the body location of the stimulus for differing rates of approach to a charged electrode, and for cutaneous temperature changes. A neuroelectric model is described, and used to account for sensitivity to a variety of stimulus waveforms. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

No abstracts in this category.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N85-15375# Navy Clothing and Textile Research Facility, Natick, Mass.
THE NEW NAVY FLIER'S FIRE-RESISTANT BLUE COVERALL Final Report
L. G. Boutin Aug. 1984 30 p
(AD-A146611; NCTRF-155) Avail: NTIS HC A03/MF A01 CSCL 11/5

The Navy Clothing and Textile Research Facility (NCTRF), at the request of the Naval Air Systems Command, has developed a flyer's blue aramid coverall. NAVAIR's objective was to develop a unique blue flight coverall to enhance morale and the retention levels of Naval aviators. NAVAIR requested the coverall be similar to the Air Force CWU-27/P coverall but have a pencil pocket flap and shoulder epaulets for attachment of the Navy's soft shoulder boards. The fabric used for the coverall is a 95/5 Nomex/Kevlar piece-dyed material. Off-the-shelf piece-dyed material was purchased and tested in the NCTRF laboratory to the same criteria as the solution-dyed fabric used in the Air Force coverall. Although the fabric did not pass all tests, NCTRF felt that a purchase document could be written for an off the shelf fabric that meets the critical requirements. NCTRF then procured 500 new coveralls for NAVAIR and distributed these, as directed, to Navy, Air Force and Coast Guard installations. Twelve coveralls underwent fire pit testing at NADC. The fire pit testing showed that the

coveralls did provide satisfactory protection for the conditions in which they would be used. GRA

N85-15376# National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Biomedical and Behavioral Science.
HUMAN ASPECTS IN OFFICE AUTOMATION
B. G. F. Cohen 16 Apr. 1984 202 p refs
(PB84-240738) Avail: NTIS HC A10/MF A01 CSCL 05E

Aspects of stress encountered in office environments are reviewed. The tight building syndrome is defined. The syndrome refers to a high incidence of similar, nonspecific complaints such as upper respiratory irritation, headache, dizziness, or drowsiness among groups of workers who spend extended periods of time in buildings that use mechanical systems for ventilation. Toxic concentrations of substances such as carbon-monoxide (630080), nitrogen-dioxide (10102440), formaldehyde (50000), or butyl-methacrylate (97881) were found in office environments due to malfunctioning or inadequate ventilation. Organizational factors affecting stress among clerical workers are discussed. The impact of organizational factors on visual strain experienced with video display terminals is considered. Clerical health and safety issues are noted and ergonomic aspects of the workplace are considered. GRA

N85-14808*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HELICOPTER HUMAN FACTORS PROGRAMS AND PLANS
E. M. Huff *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 13-22 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

N85-14819*# Miami Univ., Coral Gables, Fla.
HUMAN FACTORS IN COCKPIT AUTOMATION
Earl L. Wiener *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 173-186 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

N85-14820*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTELLIGENT INTERFACES FOR TACTICAL AIRBORNE PLATFORMS
Azad Madni *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 187-196 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

N85-14821*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
HUMAN FACTORS OF VISUAL DISPLAYS
Harry L. Snyder *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 197-202 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

N85-14822*# Wherry (Robert J., Jr.), Chalfont, Pa.
CREWSTATION DESIGN AND VALIDATION
Robert J. Wherry, Jr. *In* NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 203-228 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

N85-14824*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AVIONICS TECHNOLOGY - SYSTEM CONCEPTS
J. S. Bull and R. B. Huntoon *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 239-246 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

N85-14825*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MAN-MACHINE INTERFACE REQUIREMENTS - ADVANCED TECHNOLOGY
R. W. Remington and E. L. Wiener *In its* Technical Workshop: Advanced Helicopter Cockpit Design Concepts Dec. 1984 p 247-266 (For primary document see N85-14806 06-04)
Avail: NTIS HC A15/MF A01 CSCL 05H

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N85-15377# Commonwealth Scientific and Industrial Research Organization, Mordialoc (Australia). Div. of Atmospheric Research.
HIGH SPEED MAGNETIC TAPE INTERFACE FOR A MICROCOMPUTER
John C. Scott 1984 20 p refs
(CSIRO-TP-7; ISBN-0-643-03743-8) Avail: NTIS HC A02/MF A01

A high speed interface for transferring data between a 9 track high performance magnetic tape unit and an Apple type microcomputer is described. The interface uses direct memory access (DMA) which is capable of data transfer rates up to 2x10(6) 8 bit bytes per second. After initiation of data transfer, the process is completely transparent to the processor. All functions of the magnetic tape unit are available to the programmer via any level of programming, and the tapes produced are fully compatible with ANSI and IBM specifications. Author

N85-15378# Office of Naval Research, London (England).
WORKSHOP ON COMPUTER ARCHITECTURE
J. F. Blackburn 19 Jul. 1984 12 p Conf. held in London, 16-17 May 1984
(AD-A146455; ONRL-C-2-84) Avail: NTIS HC A02/MF A01 CSCL 09/2

The US Office of Naval Research, London, hosted a workshop on computer architecture on 16 and 17 May 1984. The meeting brought together 12 of the leading research professionals in European universities and several interested persons from the US government to discuss the present state of research in this important field and to assess future directions. Most of the discussion was on hardware design; one presentation concentrated on the programming of parallel processing systems. Author (GRA)

N85-15379# Naval Surface Weapons Center, White Oak, Md.
ARCHITECTURE, DESIGN, AND SYSTEM; PERFORMANCE ASSESSMENT AND DEVELOPMENT METHODOLOGY FOR COMPUTER-BASED SYSTEMS. VOLUME 1: METHODOLOGY DESCRIPTION, DISCUSSION, AND ASSESSMENT

J. Franklin, C. Gray, Jr., and A. Wrenn 30 Dec. 1983 40 p (AD-A146577; NSWC/TR-83-324-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

This volume describes, discusses, and assesses a performance assessment and development methodology for computer-based systems comprised of MSI (medium scale integration) and LSI (large scale integration) computers. The report is not meant to be user's manual or a detailed documentation description of the methodology. In addition to describing the methodology one chapter is devoted to a discussion of testing versus analytic assessment. GRA

N85-15380# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
SPECIFICATION OF A TRANSPORT PROTOCOL FOR COMPUTER COMMUNICATIONS. VOLUME 1: OVERVIEW AND SERVICES. VOLUME 2: CLASS 2 PROTOCOL. VOLUME 3: CLASS 4 PROTOCOL Final Report
Jun. 1984 509 p refs
(PB84-222850; NBSIR-84-2880-Vols-1/2/3/3; NBS/DF-84/005A) Avail: NTIS HC A22/MF A01 CSCL 09B

The tape contains the source code for the NBS implementation of ISO Scenario Interpreter and Exception Generator; suite of approximately 250 test scenarios; and documentation thereof. the source code is in the C language and the resulting software was executed in a UNIX environmental on a PDP-11/70. GRA

N85-15381# Federal Compiler Testing Center, Falls Church, Va.
NECIS INCORPORATED, NEC ASTRA MODEL 270, COBOL 74 VERSION 8.3 (COBOL TECHNICAL REPORT)
6 Apr. 1984 12 p refs
(PB84-227933; OSD/FSTC-84/176) Avail: NTIS HC A02/MF A01 CSCL 09B

A technical report for the NEC Information Systems, Inc., COBOL 74 Version 8.3 running under the NEC ITOS Version 8.3 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Module Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). All the discrepancies found, if any, are given. GRA

N85-15382# Computer Corp. of America, Cambridge, Mass.
NG368351
DISTRIBUTED DATABASE COMPONENTS IN A DBMS (DATABASE MANAGEMENT SYSTEM) COMPONENT ARCHITECTURE Final Report
F. A. Manola Mar. 1984 75 p refs Sponsored by NBS
(PB84-217546; CCA-83/13; NBS/GCR-84-463) Avail: NTIS HC A04/MF A01 CSCL 09B

Preliminary specifications and processing functions for distributed database processing components to be added to the DBMS component architecture developed by Computer Corporation of America for the National Bureau of Standards are described. The component architecture is intended to serve as a potential framework for developing DBMS standards. Functions to be performed by the additional components include distributed query processing, concurrency control, and recovery. GRA

N85-15383# National Bureau of Standards, Washington, D.C. Systems Components Div.
PROCEEDINGS OF THE NATIONAL BUREAU OF STANDARDS AND NATIONAL SECURITY AGENCY WORKSHOP ON STANDARDIZATION ISSUES FOR OPTICAL DATA DISK (OD3) TECHNOLOGY Final Report
J. B. Freedman Apr. 1984 242 p Workshop held at Gaithersburg, Md., 1-3 Jun. 1983 Sponsored in part by National Security Agency
(PB84-217785; NBS/SP-500-111; LC-84-601025) Avail: NTIS HC A11/MF A01; also available from SOD as SN003-003-02573-9 CSCL 09B

The proceedings of the National Bureau of Standards/National Security Agency jointly-sponsored Workshop on Standardization Issues for Optical Digital Data Disk (OD) Technology, held in Gaithersburg, Maryland, June 1-3, 1983 are discussed. The objective of this workshop was to promote discussion and interchange among current and potential OD users and suppliers, regarding the prospects for OD data interchange standardization. The workshop presentations include definitions of the physical, dimensional, optoelectrical, quality and data transfer characteristics of OD media, as related to the drive performance. A range of OD applications and their standards' requirements are also described. The various methods currently used for estimating media life expectancies and the potential for standardized terminologies and procedures for such assessments are discussed. GRA

N85-15384# System Development Corp., McLean, Va.
COMPUTER SCIENCE AND TECHNOLOGY: OVERVIEW OF COMPUTER SECURITY CERTIFICATION AND ACCREDITATION Final Report, Jan. 1981 - Sep. 1982
Zella G. Ruthberg and William Neugent Apr. 1984 26 p
(Contract NB80-SBCA-0323)
(PB84-217819; NBS/SP-500-109; LC-84-601002) Avail: NTIS HC A03/MF A01; also avail. SOD as SN003-003-02567-4 CSCL 09B

This overview summarizes how to establish and carry out a program and a technical process for computer security certification and accreditation of sensitive computer applications. The overview identifies and briefly describes the steps involved in performing computer security certification and accreditation; it identifies and briefly discusses important issues in managing a computer security certification and accreditation program; and it identifies and briefly describes the principal functional roles needed within an organization to carry out such a program. Recertification and reaccreditation and its relation to change control are also touched upon. A discussion of evaluation techniques to be used for certification includes risk analysis, EDP audit, VV&T (verification, validation, and testing), and security safeguard reviews. The relation of these to the system lifecycle is indicated. GRA

N85-15385# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
SPECIFICATION OF A TRANSPORT PROTOCOL FOR COMPUTER COMMUNICATIONS. VOLUME 4: SERVICE SPECIFICATIONS. VOLUME 5: GUIDANCE FOR THE IMPLEMENTOR. VOLUME 6: GUIDANCE FOR IMPLEMENTATION SELECTION Final Report
Jun. 1984 135 p refs
(PB84-222868; NBSIR-84-2880-Vols-4/5/6; NBS/DF-84/005B) Avail: NTIS HC A07/MF A01 CSCL 09B

The guidelines for the implementation of a protocol which conforms to the Federal Information Processing Standards are provided. Formal and informal definitions of the services provided by the transport layer to it users, and of the services required from the network layer by the transport layer are also provided. B.G.

N85-15386# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
SPECIFICATION OF A TRANSPORT PROTOCOL FOR COMPUTER COMMUNICATIONS. VOLUME 7: TESTING OSL PROTOCOLS, A COMPENDIUM OF PAPERS. VOLUME 8: USER'S GUIDE TO THE TESTING SYSTEM FOR IMPLEMENTATIONS OF THE ICST TRANSPORT PROTOCOL. VOLUME 9: A TEST SUITE FOR IMPLEMENTATIONS OF THE ICST TRANSPORT PROTOCOL. VOLUME 10: SPECIFICATION OF A REMOTE SCENARIO INTERPRETER FOR IMPLEMENTATIONS OF THE ICST TRANSPORT PROTOCOL Final Report
Jun. 1984 301 p refs
(PB84-222876; NBSIR-84-2880-Vols-7/8/9/10; NBS/DF-84/005C) Avail: NTIS HC A14/MF A01 CSCL 09B

An architecture was developed for testing implements of OSI protocols, and to establish conformance with the appropriate Federal Information Processing Standards. A justification is given for the specific design choices made. The architectural elements are described and an example of a test language used to drive the system is given. Some examples are given to indicate the

practical utility of this system, demonstrated by over 18 months of testing experience. Author

N85-15387# Federal Communications Commission, Washington, D. C. Office of Science and Technology.
FCC (FEDERAL COMMUNICATION COMMISSION) METHODS OF MEASUREMENT OF RADIO NOISE EMISSIONS FROM COMPUTING DEVICES
Dec. 1983 27 p refs
(PB84-243591; FCC/OST/MP-4/1983) Avail: NTIS
HC A03/MF A01 CSCL 09B

This standard sets forth uniform methods of measurement of radio noise emitted from computing devices defined in section 15.4 of Federal Communication Commission (FCC) Rules. The technical standards for computing devices are set forth in Subpart J of Part 15 of FCC Rules (47 CFR part 15J). Methods for the measurement of radiated and power line conducted radio noise are covered. These methods of measurement will be used by the FCC in testing computing systems, computing devices, and peripheral devices intended to be used with computing devices. Applicants for certification of Class B computing devices should empty these methods. Author (GRA)

N85-15388# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL RESEARCH INCORPORATED, IBM PC XT, FORTRAN-77 V4.0 Validation Summary Report
20 Jun. 1984 16 p refs
(PB84-243633; OIT/FSTC-84/205) Avail: NTIS
HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Digital Research, Inc., FORTRAN-77 Version 4.0 running under the IBM PCXTDOS Version 2.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. An overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-15389# Federal Compiler Testing Center, Falls Church, Va.
PERKIN-ELMER, PERKIN-ELMER 3230, FORTRAN 7 D R00-00 Validation Summary Report
7 Aug. 1984 13 p refs
(PB84-243682; OIT/FSTC-84/385) Avail: NTIS
HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Perkin-Elmer, FORTRAN VII D R00-00 running under the Edition VII Version 2.4 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. An overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-15390# Federal Compiler Testing Center, Falls Church, Va.
GOULD INCORPORATED, GOULD PS-3000, GOULD PS-3000 FORTRAN 77 V2.1 Validation Summary Report
29 Mar. 1984 17 p refs
(PB84-229178; OIT/FSTC-84/124) Avail: NTIS
HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Gould Incorporated, Gould PS-3000 FORTRAN 77 V2.1 running under the UTX-3000 1.09j provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. An overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-15391# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
DATA GENERAL CORPORATION, ECLIPSE C150, INTERACTIVE COBOL REVISION 1.30 (COBOL TECHNICAL REPORT)
2 Apr. 1984 12 p
(PB84-227834; OIT/FSTC-84/193) Avail: NTIS
HC A02/MF A01 CSCL 09B

This FSTC Technical Report for the Data General Corporation, Interactive COBOL Rev. 1.30 running under the AOS Revision 5.02 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Inter-Program Communication of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the discrepancies found - if any. A companion report Validation Summary Report OIT/FSTC-84/191 provides information regarding the validation of the compiler as the Low level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N85-15392# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
DATA GENERAL CORPORATION, ECLIPSE C150, INTERACTIVE COBOL REVISION 1.30 Validation Summary Report
2 Apr. 1984 48 p
(PB84-227891; OIT/FSTC-84/191) Avail: NTIS
HC A03/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Data General Corporation, Interactive COBOL Rev. 1.30 running under the AOS Revision 5.02 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15393# Federal Compiler Testing Center, Falls Church, Va.
IBM CORPORATION, IBM SERIES/1 4955, IBM SERIES/1 HOST COBOL RELEASE 1.1 EDX (COBOL TECHNICAL REPORT)
27 Mar. 1984 13 p
(PB84-227909; OIT/FSTC-84/162) Avail: NTIS
HC A02/MF A01 CSCL 09B

This FSTC Technical Report for the IBM Corporation, IBM Series/1 4955 running under the IBM Series/1 Host COBOL Release 1.1 EDX provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Level 1, Sort-Merge, Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the discrepancies found - if any. A companion report Validation Summary Report OIT/FSTC-94/160 provides information regarding the validation of the compiler as the Low-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N85-15394# Federal Compiler Testing Center, Falls Church, Va.
IBM CORPORATION, IBM SERIES/1 4955, IBM SERIES/1 HOST COBOL RELEASE 1.1 EDX Validation Summary Report
27 Mar. 1984 51 p refs
(PB84-227818; OIT/FSTC-84/160) Avail: NTIS
HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the IBM Corporation, IBM Series/1 4955 running under the IBM Series/1 Host COBOL Rel. 1.1 EDX provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the CCVS74 4.1 level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15395# Federal Compiler Testing Center, Falls Church, Va.
IBM CORPORATION, IBM SERIES/1 4955, IBM SERIES/1 HOST COBOL RELEASE 1.1 RPS Validation Summary Report
27 Mar. 1984 51 p refs
(PB84-227917; OIT/FSTC-84/161) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the IBM Corporation, IBM Series/1 4955 running under the IBM Series/1 Host COBOL Rel. 1.1 RPS provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the CCVS74 4.1 level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancis found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15396# Federal Compiler Testing Center, Falls Church, Va.
IBM CORPORATION, IBM SERIES/1 4955, IBM SERIES/1 HOST COBOL RELEASE 1.1 RPS (COBOL TECHNICAL REPORT)
27 Mar. 1984 13 p refs
(PB84-227925; OIT/FSTC-84/163) Avail: NTIS HC A02/MF A01 CSCL 09B

This FSTC Technical Report for the IBM Corporation, IBM Series/1 4955 running under the IBM Series/1 Host COBOL Release 1.1 RPS provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O, Level 1, Sort-Merge, Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the discrepancies found - if any. A companion report Validation Summary Report OIT/FSTC-84/161 provides information regarding the validation of the compiler as the Low-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N85-15397# Federal Compiler Testing Center, Falls Church, Va.
NECIS, INCORPORATED, NEC ASTRA MODEL 270 COBOL 74 VERSION 8.3 Validation Summary Report
6 Apr. 1984 55 p refs
(PB84-227636; OSD/FSTC-84/175) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the NEC Information Systems, Inc., COBOL 74 Version 8.3 running under the NEC ITOS Version 8.3 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. All the discrepancies found - if any, are given. Include are an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15398# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, DECSYSTEM-20, MODEL 2060, COBOL V13 Validation Summary Report
23 Apr. 1984 53 p refs
(PB84-227958; OSD/FSTC-84/186) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Digital Equipment Corp., COBOL V13 running under the TOPS-20 Release 5.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the April 23, 1984 level of FIPS PUB 21-1. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15399# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, DECSYSTEM-20, MODEL 2060, COBOL V13 (COBOL TECHNICAL REPORT)
18 Apr. 1984 13 p refs
(PB84-227966; OIT/FSTC-84/188) Avail: NTIS HC A02/MF A01 CSCL 09B

A technical report for the Digital Equipment Corp., COBOL V13 running under the TOPS-20 Release 5.1 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Low Intermediate of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). All discrepancies found - if any, are given. GRA

N85-15400# Federal Compiler Testing Center, Falls Church, Va.
NORTHERN TELECOM, INCORPORATED, IBM 3033 (COMPILATION), NTI-585/565 (EXECUTION), XCOBOL RELEASE 4.1 VERSION H(01) Validation Summary Report
10 May 1984 60 p refs
(PB84-227875; OIT/FSTC-84/221) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Northern Telecom, Inc., XCOBOL Release 4.1 running under the MVS Release 5 OMNITASK 4.1 Release 1A11C provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. All the discrepancies found - if any, are given. An overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-15401# Federal Compiler Testing Center, Falls Church, Va.
NCR CORPORATION, NCR I9300, NCR ITX COBOL RELEASE 3.0 Validation Summary Report
14 May 1984 52 p refs
(PB84-228055; OIT/FSTC-84/225) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the NCR Corporation, NCR ITX COBOL Release 3.0 running under the NCR ITX Release 3.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15402# Federal Compiler Testing Center, Falls Church, Va.
NCR CORPORATION, NCR I9300, NCR ITX COBOL RELEASE 3.0 (COBOL TECHNICAL REPORT)
18 May 1984 12 p refs
(PB84-228063; OIT/FSTC-84/226) Avail: NTIS HC A02/MF A01 CSCL 09B

A technical report for the NCR Corporation, NCR ITX COBOL Release 3.0 running under the NCR ITX Release 3.0 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O., Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). All the discrepancies found - if any, are given. GRA

N85-15403# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
GOULD INCORPORATED, GOULD PS-3000, GOULD PS-3000 COBOL V2.0 Validation Summary Report
Mar. 1984 81 p

(PB84-229160; OIT/FSTC-84/123) Avail: NTIS HC A05/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Gould Incorporated, Gould PS-3000 COBOL V2.0 running under the UTX 1.09j provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15404# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.

GOULD INCORPORATED, GOULD PS-3000, GOULD PS-3000 BASIC INTERPRETER VERSION 1.00 Validation Summary Report

29 Mar. 1984 17 p

(PB84-229186; OIT/FSTC-84/125) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Gould Incorporated, Gould PS-3000 BASIC Interpreter Ver. 1.03 running under the UTX. 1.09j provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15405# Federal Compiler Testing Center, Falls Church, Va.

DIGITAL EQUIPMENT CORPORATION, PDP-11/23-PLUS PDP-11 FORTRAN-77 V5.0 Validation Summary Report

14 Jul. 1984 17 p refs

(PB84-227610; OIT/FSTC-84/270) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Digital Equipment Corp., PDP-11 FORTRAN-77 V5.0 running under the RT-11 Version 5.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Subset FORTRAN level of FIPS PUB 69. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15406# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.

COMPUTERVISION CORPORATION, CDS-4000 32-BIT PROCESSOR, CV FORTRAN VERSION 2.84 Validation Summary Report

10 Jun. 1984 36 p

(PB84-227867; OIT/FSTC-84/110) Avail: NTIS HC A03/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Computervision Corp., CV FORTRAN Version 2.84 running under the CVMOS Revision 2.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the June 10, 1984 level of FIPS PUB 69. All the discrepancies found - if any, are given. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15407# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.

PLEXUS COMPUTERS, INC., PLEXUS P/60, PLEXUS FORTRAN 77 VERSION 1.1 Validation Summary Report

15 Feb. 1984 18 p

(PB84-227859; OIT/FSTC-84/100) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Plexus Computers. Inc., Plexus FORTRAN 77 Version 1.1 running under the P/60 SYS 3.1 UNIX provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Subset Level FORTRAN level of FIPS PUB 69. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15408# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.

CONTROL DATA CORPORATION, CYBER 835, COBOL RELEASE 5.3 LEVEL 614 Validation Summary Report

10 Apr. 1984 73 p

(PB84-227842; OIT/FSTC-84/195) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Control Data Corporation, COBOL Release 2.2 Level 596 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15409# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.

PRIME COMPUTER, INC., PRIME 750, COBOL-74 REVISION 19.3.2 Validation Summary Report

5 Apr. 1984 55 p

(PB84-227826; OIT/FSTC-84/170) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Prime Computer, Inc., COBOL-74 Revision 19.3.2 running under the PRIMOS Revision 19.3 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15410# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.

SPERRY UNIVAC, SYSTEM 80 MODEL 6, OS/3 COBOL, VERSION 08.00/08 Validation Summary Report

31 Jan. 1984 71 p

(PB84-227800; OIT/FSTC-84/155) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Sperry Univac, OS/3 COBOL Version 08.00/08 running under the OS/3 Level 8.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to

each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15411# Federal Compiler Testing Center, Falls Church, Va.
MODULAR COMPUTER SYSTEMS, INCORPORATED, MODCOMP CLASSIC 7860, MODCOMP FORTRAN 77/16 VERSION A.0
5 Jul. 1984 13 p refs
(PB84-230556; OIT/FSTC-84/330) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Modular Computer Systems, Inc., MODCOMP FORTRAN 77/16 Version A.0 running under the MAX IV Release H.2 provides a consolidated summary of the results obtained from the validation of (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15412# Federal Compiler Testing Center, Falls Church, Va.
MODULAR COMPUTER SYSTEMS, INCORPORATED, MODCOMP CLASSIC 7860, MODCOMP NASA EXTENDED FORTRAN 78 VERSION A.40 Validation Summary Report
5 Jul. 1984 18 p refs
(PB84-230549; OIT/FSTC-84/331) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Modular Computer Systems, Inc., MODCOMP NASA EXTENDED FORTRAN 78 Version A.40 running under the MAX IV Release H.2 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15413# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, MICRO/PDP-11, COBOL-81 VERSION 2.2 Validation Summary Report
20 Jun. 1984 52 p
(PB84-229236; OIT/FSTC-84/255) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Digital Equipment Corp., COBOL-81 Version 2.2 running under the MICRO/RSX Version 1.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15414# Federal Compiler Testing Center, Falls Church, Va.
NCR CORPORATION, NCR 9300, NCR ITX-BASIC RELEASE 2.0 Validation Summary Report
15 May 1984 13 p refs
(PB84-229228; OIT/FSTC-84/227) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the NCR Corporation, NCR ITX-BASIC, Release 2.0 running under the NCR ITX Release 2.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15415# Federal Compiler Testing Center, Falls Church, Va.
SPERRY CORPORATION, 1100/80, UBASIC/BBASIC LEVEL 9R1 Validation Summary Report
21 May 1984 13 p refs
(PB84-229202; OSD/FSTC-84/252) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Sperry, UBASIC/BBASIC Level 9R1 running under the OS1100 Level 38R5 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15416# Federal Compiler Testing Center, Falls Church, Va.
SPERRY CORPORATION, 1100/80 ASC2 FORTRAN LEVEL 11R1 Validation Summary Report
21 May 1984 12 p refs
(PB84-229194; OSD/FSTC-84/251) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Sperry, ASCII FORTRAN Level 11R1 running under the OS1100 Level 38R5 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15417# Federal Compiler Testing Center, Falls Church, Va.
COMPUTER SCIENCES CORPORATION, UNIVAC 1100/80, CSTS COBOL RELEASE COB250 Validation Summary Report
31 May 1984 73 p refs
(PB84-229154; OIT/FSTC-84/230) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Computer Sciences Corporation, CSTS COBOL Release COB250 running under the CSTS SYS 330 Release 3.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the May 31, 1984 level of FIPS PUB 21-1. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15418# Federal Compiler Testing Center, Falls Church, Va.
COMPTER SCIENCES CORPORATION, UNIVAC 1100/80, CSTS BASIC RELEASE BAS180 Validation Summary Report
1 Jun. 1984 10 p refs
(PB84-229145; OIT/FSTC-84/231) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Computer Sciences Corporation, CSTS BASIC Release BAS180 running under the CSTS SYS330 Release 3.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. All the discrepancies found - if any, are given. Included an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15419# Federal Compiler Testing Center, Falls Church, Va.
WANG LABORATORIES, INCORPORATED, WANG VS100, FORTRAN 77 VERSION 01.00.02 Validation Summary Report
5 Mar. 1984 12 p
(PB84-228014; OIT/FSTC-84/210) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Wang Laboratories, Inc., FORTRAN 77 Version 01.00.02 running under the 06.19.XX provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15420# Federal Compiler Testing Center, Falls Church, Va.
CONTROL DATA CORPORATION, CYBER 835, BASIC RELEASE 3.5 LEVEL 614 Validation Summary Report
10 Apr. 1984 13 p
(PB84-227990; OIT/FSTC-84/196) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Control Data Corporation, BASIC Release 3.5 Level 614 running under the NOS Release 2.2 Level 596 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15421# Federal Compiler Testing Center, Falls Church, Va.
DATA GENERAL CORPORATION, ECLIPSE C350, AOS COBOL RELEASE 3.51 Validation Summary Report
2 Apr. 1984 55 p
(PB84-227982; OIT/FSTC-84/190) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Data General Release 3.51 running under the AOS Revision 5.01 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. All the discrepancies found - if any, are given. All categories of discrepancies by level/module within X3.23-1974 are listed. A section relating the categories of discrepancies to each of the Federal Levels of the Language, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-15422# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, DECSYSTEM-20 2060 MODEL B, FORTRAN-20 VERSION 10
23 Apr. 1984 12 p
(PB84-227974; OIT/FSTC-84/187) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Digital Equipment Corp., FORTRAN-20 Version 10, running under the TOPS-20 Release 5.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB69). The compiler was validated against the April 23, 1984 level of FIPS PUB 69. All the discrepancies found - if any, are given. An overview of the validation which lists all categories of discrepancies wihtin X3.9-1978, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-15020# Joint Publications Research Service, Arlington, Va.
INTERNAL STRUCTURE OF MICROPROCESSOR Abstract Only
V. Ye. Lokhmatyy and S. I. Trankov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 30 Transl. into ENGLISH from Avtomatika, Telemekhan. (Moscow), no. 1, Jan. 1984 p 32-34 (For primary document see N85-14991 06-31) Avail: NTIS HC A04

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N85-15423# Naval Postgraduate School, Monterey, Calif.
IMPLEMENTATION OF A ZILOG Z-80 BASE REALIZATION LIBRARY FOR THE COMPUTER SYSTEMS DESIGN ENVIRONMENT M.S. Thesis
T. J. Smith, Jr. Mar. 1984 107 p
(AD-A146359) Avail: NTIS HC A06/MF A01 CSCL 09/2

This thesis develops a Zilog-80 based realization library for use in the automated design of microprocessor based control systems. The library is designed around Standard Bus boards. This bus is supported by a number of manufacturers for use in breadboard construction, through a number of standard cards. The library of primitives developed implement the constructions used in Computer System Design Language (CSDL) for the Z-80 cpu. CSDL is a high level language that allows the specifications of tasks and procedures, and their time constraints. Use of the design system and this library can enable Z-80 based prototype controllers to be quickly designed and built. Author (GRA)

N85-15424# JAYCOR, Alexandria, Va.
INVESTIGATIVE FINDINGS OF IMAGE ENHANCEMENT TECHNIQUES Final Report, 17 Aug. 1983 - 16 Jan. 1984
W. B. Lander 26 Mar. 1984 126 p
(Contract N00014-83-C-2273)
(AD-A146392; AD-E001736; JAYCOR-J206-84-004/6238) Avail: NTIS HC A07/MF A01 CSCL 17/8

Several sections are discussed in this report. Section 1: Interactive Image Filtering Programs, Section 2: Interactive Image Utility Programs, Section 3: DeAnza IP8500 Manipulation Routines and Section 4: Image Manipulation Program. GRA

N85-15425# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
SPECIALIZED SILICON COMPILERS FOR LANGUAGE RECOGNITION Ph.D. Thesis. Interim Report
M. J. Foster Jul. 1984 115 p
(Contracts F33615-81-K-1539; N00014-76-C-0370; N00014-80-C-0236)
(AD-A146526; CMU-CS-84-143) Avail: NTIS HC A06/MF A01 CSCL 09/2

A specialized silicon compiler is a design tool that accepts a behavioral specification for a circuit and produces the layout for a small, fast VLSI chip. Each specialized silicon compiler produces chips for only a small task domain. Because the task domain is restricted, a specialized silicon compiler can use application-dependent techniques for circuit design and layout, thus ensuring the efficiency of the chips that it produces. The major portion of this thesis describes a specialized silicon compiler that generates recognizers for regular languages. Given a regular expression describing a language to be recognized, the compiler automatically produces the layout for a high-speed recognizer. Besides being a prototype of a useful tool for designing recognizers, this compiler serves as a model for compilers specialized to other areas. It is used to illustrate techniques for construction and verification of specialized silicon compilers. It describes a specialized programmable layout for language recognizers. A specialized programmable layout is a chip that is designed as a target for a particular specialized silicon compiler. Parts of the circuit that are the same for all problems in the task domain are laid out in advance, while parts of the circuit that vary from one problem to another are left to be programmed. The layout described in this thesis has cells for primitive recognition operations laid out in advance and is

programmed for a particular regular language by interconnecting these cells. This layout was implemented in NMOS and is programmed after fabrication by cutting metal lines using a laser.
GRA

N85-15426# Naval Postgraduate School, Monterey, Calif.
COMPUTER-MANAGED INSTRUCTION: THEORY, APPLICATION, AND SOME KEY IMPLEMENTATION ISSUES M.S. Thesis
M. Korbak, Jr. Mar. 1984 126 p
(AD-A146564; AD-E440255) Avail: NTIS HC A07/MF A01 CSCL 05/9

As a mechanism for understanding computer use in education, this thesis focuses on Computer-Managed Instruction (CMI). The first chapters provide the background, so CMI can be distinguished from other computer applications in education. Chapter III examines the theoretical basis for CMI, showing that issues in education rather than in computer technology serve as the foundation for CMI. Chapter 4 discusses aspects of hardware, system configurations, and software. It also presents a comprehensive discussion of the generic functions of CMI systems. Chapter V highlights the diverse nature of CMI applications by focusing on two operational CMI systems. Chapter 6 examines the importance of teacher acceptance of the CMI system during implementation. In contrast to Computer Aided Instruction (CAI), which was externally imposed onto the educational field, CMI origins rest in the classroom itself. Because of this and its slow, low-keyed but steady developmental pattern, CMI appears to have a reasonable probability of continued success. GRA

N85-15427# Naval Postgraduate School, Monterey, Calif.
REUSABLE SOFTWARE M.S. Thesis
W. C. Johnson Mar. 1984 69 p
(AD-A146575) Avail: NTIS HC A04/MF A01 CSCL 09/2

This thesis reviews the topic of software reusability with special emphasis upon the reusability of products of the design phase of the software life cycle. The ideas of software reuse as a capital-intensive process and reuse of products of all phases of the software life cycle are also presented. The thesis presents a formal definition of the term software reusability, presents a hypothetical design scenario incorporating reuse, and compares the requirements of a reusable software design methodology with features of existing design methodologies. Other issues pertinent to software reuse in general, and reuse of design in particular, are reviewed.
GRA

N85-15428# Naval Postgraduate School, Monterey, Calif.
A STANDARD OPERATING SYSTEM INTERFACE FOR MICROCOMPUTER SOFTWARE DEVELOPMENT M.S. Thesis
R. Stemp Mar. 1984 117 p
(AD-A146584) Avail: NTIS HC A06/MF A01 CSCL 09/2

The majority of discussion directed at standardizing microcomputer operating system has revolved primarily around establishment of a set of standardized primitives (a kernel) to be made available for use by programmers. To this end little progress has been made. Establishment of a universal kernel for microcomputer operating systems, or for mini or mainframes for that matter, is not only virtually impossible, but also highly narrow in scope. This thesis presents a possible solution to standardization efforts through implementation of a Dynamic Kernel achieved by the establishment of a universal protocol between application programs and microcomputer operating systems via a standard interface structure. A high level design of the necessary interface structure and recommended primitives for initial inclusion in the Dynamic Kernel are presented along with brief discussions of the inherent dangers and benefits that may be encountered. GRA

N85-15429# Scripps Institution of Oceanography, La Jolla, Calif.
TIME SERIES ANALYSIS PROGRAMS FOR STRATIGRAPHIC DATA
P. Schiffelbein Jul. 1984 47 p
(Contract N00014-80-C-0440)
(AD-A146627; SIO-REF-84-22) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report documents a set of FORTRAN programs and subroutines for analyzing stratigraphic time series data. Each project is briefly explained to provide a context for the programs. All algorithms used in the project are also explained. All programs were written for the UCSD Vax 11/780 (VMS) computer.
Author (GRA)

N85-15430# Naval Ocean Systems Center, San Diego, Calif.
TWO PROGRAMS FOR THE HP9836C COMPUTER TO ACQUIRE FREQUENCY OR VOLTAGE DATA FROM A SOURCE Technical Document Report, Mar. - Jun. 1984
M. R. Paulfson Sep. 1984 35 p
(AD-A146632; NOSC/TD-738) Avail: NTIS HC A03/MF A01 CSCL 09/2

The objective of this work was to provide a computer program for the HP9836C which could read frequency data from the HP5345A Frequency Counter and plot these data on the computer screen, with the option of dumping the plots to the line printer. The data were also to be recorded on disk for further processing. While frequency was of primary interest here, the program should be useful for other types of data, such as phase locked loop error voltage or amplitude readings. Two programs have been written in Basic to obtain frequency data from the frequency counter. While the two programs are quite similar, the first one reads frequency, plots its, and stores it on the disk. The main difference in the second program is that it uses the interrupt technique, so that between frequency measurements it can do other things. GRA

N85-15431# Royal Signals and Radar Establishment, Malvern (England).
SOFTWARE CONFIGURATION MANAGEMENT ACROSS PROJECT BOUNDARIES AND IN DISTRIBUTED DEVELOPMENT ENVIRONMENTS
M. Stanley 1984 31 p
(AD-A146662; RSRE-MEMO-3704; DRIC-BR-92718) Avail: NTIS HC A03/MF A01 CSCL 09/2

When software development is shared between several different sites, or host computers, or even between different development organizations, problems which are not evident in more compact development systems arise. Many of these problems manifest themselves in software configuration management. If software developed on one project is to be reused on another project then software configuration management needs to extend beyond the individual project into a wider area. This paper addresses the problems of software configuration management when sharing software projects and between host development systems, and between projects, using an integrated Programming Support Environment. The discussion assumes the availability of some of the facilities that were proposed for inclusion in the UK CHAPSE (CHILL Ada Programming Support Environment).
Author (GRA)

N85-15432# Oak Ridge National Lab., Tenn. Energy Div.
RECENT ADVANCES IN DATA COMPRESSION
G. E. Liepins 1984 5 p refs Presented at the 20th Ann. Meeting of the Southeastern Chapter of the Institute of Management Sciences, Myrtle Beach, S. Car., 27 Sep. 1984
(Contract DE-AC05-84OR-21400)
(DE85-001133; CONF-8409147-1) Avail: NTIS HC A02/MF A01

Data compression is the art of succienct data representation. Compression techniques can be characterized variously including, for example, the degree of compression and fidelity. For example, compression techniques used to speed data I/O in computer systems must have total fidelity, whereas those used to transmit visual images may be information lossy. For any data source and given level of acceptable distortion (information loss), Shannon's classical work establishes the fundamental limits for compression; no compression method can exceed the compression given by the fundamental limit. For total fidelity compression, general consensus is that additional research will result in no more than marginal improvements in compression ratio. In contrast, for

information lossy methods, there appears to be room for improvement. The most promising current information lossy methods seem to be variants of pattern matching and pattern recognition, and research on these areas promises to have applications to computer assisted design (CAD) and artificial intelligence. DOE

N85-15433# Oak Ridge National Lab., Tenn.
BEGINNER'S GUIDE TO BLOCKED RECORDS ON MAGNETIC TAPE
B. L. Kirk Sep. 1984 57 p refs
(Contract DE-AC05-84OR-21400)
(DE85-001691; ORNL/TM-9250) Avail: NTIS HC A04/MF A01

The usage of magnetic tape for data storage is examined. The appendix listings are intended to guide users in choosing the best possible parameters when blocking data of record lengths 80 or 133 bytes. Only fixed block records are of interest here. The formulas listed in the report are also applicable to records having varied lengths. The use of 80 and 133 is dictated by their popularity. DOE

N85-15434# Argonne National Lab., Ill.
RECOMMENDED DOCUMENTATION FOR COMPUTER USERS AT ANL
A. Dobyns and R. Rivetna Aug. 1984 69 p
(Contract W-31-109-eng-38)
(DE84-016285; ANL/TM-379-Rev) Avail: NTIS HC A04/MF A01

This is for all current and potential users of the services available from the Argonne National Laboratory computing systems. This manual guides in selecting documentation that will best fill the users needs. It describes all the documentation available at the Computing Services Division Document Distribution Center. If the documentation needed is not listed in this manual, investigate documentation that other division supply. Chapter 1 explains the use of this document. Chapter 2 is a block diagram that identifies the various topics for which documentation is available and identified their relationships to each other. Chapter 3 contains lists of publications organized by topics. Chapter 4 contains abstracts of each publication. And Chapter 5 describes additional publications that contains bibliographies and master indexes. B.R.

N85-15435# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
C3, INCORPORATED NGEN CP001, C3 COBOL VERSION 9.0 (COBOL TECHNICAL REPORT)
28 Mar. 1984 16 p
(PB84-216316; OIT/FSTC-84/144) Avail: NTIS HC A02/MF A01 CSCL 09B

This FSTC Technical Report for the C3, Incorporated, C3 COBOL Version 9.0 running under the C3 Version 9.0 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O, Levels 1 and 2 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the discrepancies found - if any. A companion report Validation Summary Report OIT/FSTC-84/141 provides information regarding the validation of the compiler as the High-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N85-15436# Federal Compiler Testing Center, Falls Church, Va.
BURROUGHS CORPORATION B26-CPU, BURROUGHS B20 BASIC REL. 4.0 Validation Summary Report
Mar. 1984 14 p
(PB84-216324; OIT/FSTC-84/140) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Burroughs Corporation Burroughs B20 BASIC Compiler Release 4.0 running under the BTOS Release 4.0 provides a consolidated summary of the results obtained from the validation of the compiler against the 1978 BASIC Standards (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15437# Federal Compiler Testing Center, Falls Church, Va.
CONVERGENT TECHNOLOGIES NGEN CP001, CT BASIC VERSION 9.0 Validation Summary Report
20 Mar. 1984 14 p
(PB84-216332; OIT/FSTC-84/137) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Convergent Technologies, CT BASIC Compiler Version 9.0 running under the CTOS Version 9.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15438# Computer Corp. of America, Cambridge, Mass.
TREE QUERY LANGUAGE FLAT (TQLF) SPECIFICATIONS Final Report
Frank A. Manola and Alain Pirotte Mar. 1984 180 p refs
(Contract NB79-SBCA-0086)
(PB84-217116; CCA-83-05; NBS/GCR-83-455) Avail: NTIS HC A09/MF A01 CSCL 09B

Tree Query Language Flat (TQLF) is a high-level language for defining, accessing, and manipulating data in tree (hierarchical) model databases. It has similarities to both the SQL and QUEL query languages, and was developed within the context of a program to develop a family of data models and data base languages for those models. The intent is to provide maximum commonality among members of the family, so as to reduce difficulties when changing from one model to another. The TQLF is the member of the family corresponding to the trees data model. The languages NQLF and RQLF are other members of the family corresponding respectively to the network and relational data models. GRA

N85-15439# Computer Corp. of America, Cambridge, Mass.
RELATIONAL QUERY LANGUAGE FLAT (RQLF) SPECIFICATIONS Final Report
Frank A. Manola Mar. 1984 137 p refs
(Contract NB79-SBCA-0086)
(PB84-217405; CCA-83/06; NBS-GCR-83-454) Avail: NTIS HC A07/MF A01 CSCL 09B

The Relational Query Language Flat (RQLF) is a high-level language for defining accessing, and manipulating data in relational databases. It has similarities to both the SQL and QUEL query languages, and was developed within the context of a program to develop a family of data models and database languages for those models. The intent is to provide maximum commonality among members of the family so as to reduce difficulties when changing from one model to another. The RQLF language is a member of the family corresponding members of the family corresponding respectively to the tree and network data models. GRA

N85-15440# Computer Corp. of America, Cambridge, Mass.
NETWORK QUERY LANGUAGE FLAT (NQLF) SPECIFICATIONS Final Report
Mar. 1984 185 p refs
(Contract NB79-SBCA-0086)
(PB84-217538; CCA-83-04; NBS-GCR-83-456) Avail: NTIS HC A09/MF A01 CSCL 09B

The Network Query Language Flat (NQLF) is a high-level language for defining accessing, and manipulating data in network model databases. It has similarities to both the SQL and QUEL query languages, and was developed within the context of a program to develop a family of data models and database languages for those models. The intent is to provide maximum commonality among members of the family, so as to reduce

difficulties when changing from one model to another. NQLF is the member of the family corresponding to the network data model. The languages TQLF and RQLF are other members of the family corresponding respectively to the tree and relational data models.
GRA

N85-15441# National Bureau of Standards, Washington, D.C. Systems and Software Technology Div.
INTRODUCTION TO SOFTWARE PACKAGES Final Report
S. Frankel Apr. 1984 61 p refs
(PB84-217843; NBS/SP-500-114) Avail: NTIS HC A04/MF A01; also available from SOD as SN003-003-02569-1 CSCL 09B

An introduction is given to applications software packages. The use of software packages as an alternative to in house development is encouraged and potential users of software packages are directed to sources of useful information. Application areas which are currently supported by software packages are reviewed, and the benefits of software package use versus in house development are discussed. An annotated list of publications which may be useful to potential users of software packages in searching for a package to perform a specific application, and in critically evaluating the merits of different packages is included.
Author (GRA)

N85-15442# Federal Compiler Testing Center, Falls Church, Va.
CONVERGENT TECHNOLOGIES, NGEN CP001, CT FORTRAN VERSION 9.0 Validation Summary Report
9 Mar. 1984 15 p
(PB84-229210; OIT/FSTC-84/136) Avail: NTIS HC A02/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Convergent Technologies, CT FORTRAN Version 9.0 running under the CTOS Version 9.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Subset Level FORTRAN level of FIPS PUB 69. All the discrepancies found - if any, are given. Included are an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15443# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
MICROSOFT CORPORATION, SUN MICROSYSTEMS, MICROSOFT COBOL VERSION 2.0 Validation Summary Report
4 Jun. 1984 72 p
(PB84-243401; OIT/FSTC-84/266) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Microsoft Corp., Microsoft COBOL Version 2.0 running under the Xenix Version 2.3 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-15444# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
MICROSOFT CORPORATION, IBM PC XT, MICROSOFT COBOL, VERSION 2.0 Validation Summary Report
4 Jun. 1984 73 p
(PB84-243419; OIT/FSTC-84/265) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Microsoft Corp., Microsoft COBOL Version 2.0 running under the MS-DOS Version 2.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N85-15445# Naval Surface Weapons Center, White Oak, Md.
A FRAMEWORK FOR THE DEVELOPMENT OF NAVY COMPUTER-BASED SYSTEMS: COMBAT SYSTEM ARCHITECTURE AND COMBAT SYSTEM ENGINEERING PUT INTO PERSPECTIVE
J. Franklin 30 Dec. 1983 24 p
(AD-A146460; NSWC/TR-83-360) Avail: NTIS HC A02/MF A01 CSCL 05/1

The Navy is funding two areas called combat system architecture (CSA) and combat system engineering (CSE). The question most often asked about these two areas is where does CSA stop and the design begin, and what are the specific functions of CSE. This report attempts to answer these questions by integrating CSA and CSE into a comprehensive system development process. In addition the report recommends which agency should be assigned specific responsibilities within the development process.
Author (GRA)

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N85-15446*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TRANSLATIONAL CONTROL OF A GRAPHICALLY SIMULATED ROBOT ARM BY KINEMATIC RATE EQUATIONS THAT OVERCOME ELBOW JOINT SINGULARITY
L. Keith Barker, Jacob A. Houck, and Susan W. Carzoo (Sperry Corp., Hampton, Va.) Dec. 1984 44 p refs
(NASA-TP-2376; L-15828; NAS 1.60:2376) Avail: NTIS HC A03/MF A01 CSCL 05H

An operator commands a robot hand to move in a certain direction relative to its own axis system by specifying a velocity in that direction. This velocity command is then resolved into individual joint rotational velocities in the robot arm to effect the motion. However, the usual resolved-rate equations become singular when the robot arm is straightened. To overcome this elbow joint singularity, equations were developed which allow continued translational control of the robot hand even though the robot arm is (or is nearly) fully extended. A feature of the equations near full arm extension is that an operator simply extends and retracts the robot arm to reverse the direction of the elbow bend (difficult maneuver for the usual resolved-rate equations). Results show successful movement of a graphically simulated robot arm. M.G.

N85-15447# Naval Postgraduate School, Monterey, Calif.
DESIGN AND ANALYSIS OF AN SQL (STRUCTURED QUERY LANGUAGE) INTERFACE FOR A MULTI-BACKEND DATABASE SYSTEM M.S. Thesis
G. N. Macy Mar. 1984 90 p
(AD-A146534) Avail: NTIS HC A05/MF A01 CSCL 09/2

Recent research in the area of database machines has been directed at achieving greater efficiency and increasing user-friendliness. This thesis is concerned with the second of these research directions, increasing user-friendliness. One development toward increased user-friendliness is the growing acceptance of

the relational data model and relational query languages. Relational interfaces provide the user with an easy-to-understand data representation and language with which to manipulate the data. This thesis presents the design and analysis of a relational query language interface, using the SQL relational query language, for the Multi-Backend Database System (MDBS), a database machine which uses the attribute-based model. The purpose is two-fold: first, to provide the user with an easier-to-understand language-to-machine interface, thereby making MDBS available to the wider community of relational database users; second, to investigate how the attribute-based model may be used to support relational databases. Author (GRA)

N85-15448# Army Construction Engineering Research Lab., Champaign, Ill.
THE APPLICATION OF ARTIFICIAL INTELLIGENCE TO CONTRACT MANAGEMENT Final Report
T. A. Kruppenbacher Aug. 1984 536 p
(AD-A146681; CERL-TM-P-166) Avail: NTIS HC A23/MF A01 CSCL 09/1

The area of contract management currently holds many opportunities for the development of expert systems which are capable of assuming the role of a legal consultant on matters pertaining to claim analysis. To demonstrate the feasibility of this type of expert system, the Differing Site Condition Analysis System (DSCAS) has been developed. DSCAS, built within the ROSIE programming environment, is capable of performing the legal analysis of a differing site condition (DSC) claim. The DSCAS program is based on logic which is patterned after the decision process used by a lawyer to analyze the DSC claim. DSCAS provides a very user-friendly environment in which the analysis is performed and a number of desirable features. Two of the most desirable features are: its ability to make assumptions and continue the analysis if an answer is unknown and its ability to explain the reason behind concluding that the contractor will not be allowed entitlement. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N85-15449*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A GEOMETRIC APPROACH TO HIGH RESOLUTION TVD SCHEMES Final Report
Jonathan B. Goodman and Randall J. LeVeque Oct. 1984 37 p refs
(Contract NAS1-17070)
(NASA-CR-172484; NAS 1.26:172484; ICASE-84-55) Avail: NTIS HC A03/MF A01 CSCL 12A

A geometric approach, similar to Van Leer's MUSCL schemes, is used to construct a second-order accurate generalization of Godunov's method for solving scalar conservation laws. By making suitable approximations, a scheme is obtained which is easy to implement and total variation diminishing. The entropy condition is also investigated from the standpoint of the spreading of rarefaction waves. Quantitative information is obtained for Godunov's method on the rate of spreading which explain the kinks in rarefaction waves often observed at the sonic point. B.W.

N85-15450# RAND Corp., Santa Monica, Calif.
DYNA-SIM: A NONSTATIONARY QUEUING SIMULATION WITH APPLICATION TO THE AUTOMATED TEST EQUIPMENT PROBLEM Interim Report
L. W. Miller, R. E. Stanton, and G. B. Crawford Jul. 1984 68 p
(Contract F49620-82-C-0018)
(AD-A146384; RAND/N-2087-AF) Avail: NTIS HC A04/MF A01 CSCL 15/5

This note describes the Dyna-Sim model, which provides a capability for exploring the implications of maintenance repair queing and requirements for spare parts. Several useful conclusions emerge from the study of the Automated Test Equipment (ATE) queing problem using Dyna-Sim, which are summarized as follows: The ample server assumption (more than enough ATE available to serve any repair demands) is a very poor approximation when queues become saturated in high aircraft sortie rate scenarios; and if repair times follow the exponential distribution, certain approximation techniques become available (because the queuing system satisfies requirements of a Markov process). But real-world repair times are rarely exponential. The authors used Dyna-Sim to show that in a constrained server problem, the choice of the repair time distribution is not important. Thus, analytical approximations for queuing in capability assessment models are traceable. GRA

N85-15451# Naval Ocean Systems Center, San Diego, Calif.
ALGEBRAIC TECHNIQUES IN SYSTOLIC ARRAY DESIGN Final Report, Oct. 1982 - Sep. 1983
G. E. Carlsson, H. B. Sexton, M. J. Shensa, and C. G. Wright Feb. 1984 42 p
(AD-A146417; NOSC/TR-942) Avail: NTIS HC A03/MF A01 CSCL 12/1

The goal of this project was to develop an abstract mathematical framework general enough to include the standard mesh-connected architectures as well as more complex ones such as the cube-connected cycles, but restricted enough that the algebraic techniques used (sporadically) in the analysis of systolic arrays could be generalized and applied. The authors content that node-transitive networks, based especially on Cayley graphs, offer such a framework, though whether such networks provide a truly viable theory for modelling synchronous parallel computations remains to be seen. This report describes how to restrict the theory of synchronous parallel architectures to such networks, as well as demonstrating the applicability of algebraic techniques to such networks. It also describes various tools, such as the programming language MHDL, which were developed to aid in the study of these networks. Author (GRA)

N85-15452# Defence Research Establishment Valcartier (Quebec).
DERIVATION OF RECURSIVE DIGITAL FILTERS BY THE STEP-INVARIANT AND THE RAMP-INVARIANT TRANSFORMATIONS
A. Morin and P. Labbe May 1984 52 p In ENGLISH; FRENCH summary
(AD-A146500; DREV-R-4325/84) Avail: NTIS HC A04/MF A01 CSCL 12/1

This document describes two procedures for designing recursive digital filters from continuous-time filters when the ratio of the sampling frequency to the pole frequency is small. The coefficients of the proposed digital filters, which are derived from the step and ramp invariance of the corresponding analog filters, have been determined for real and complex poles. For higher-order filters realized in a parallel form, it is demonstrated that the discrete-time transfer function of digital filters obtained by the step and ramp invariance can be derived directly from the standard z-transformation or from the partial fraction expansion of the continuous-time transfer function. The discrete-time transfer functions of the step-and ramp-invariant filters realized in a cascade form have also been derived. Finally, the performance of these methods is demonstrated by plotting the magnitude and phase responses of the first- and second-order digital filters. For high-order Butterworth and elliptic filters, the magnitude responses of step-invariant and ramp-invariant filters are compared with those obtained by usual methods such as the standard z and the bilinear transformations. GRA

N85-15453# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
SELECTING A LEADER IN A CLIQUE IN O(N LOG N) MESSAGES
P. A. Humblet Sep. 1984 14 p Presented at 23rd Conf. on Decision and Control, Las Vegas, Nev., 12-14 Dec. 1984

(Contract N00014-84-K-0357; DARPA Order 3045)
(AD-A146581; LIDS-P-1407) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper presents an extremely simple algorithm for all processors in a completely connected network to agree on a unique leader. It requires O(N log K) messages, where N is the number of processors, and K is the number of processors that independently start the algorithm. Author (GRA)

N85-15454# Lincoln Lab., Mass. Inst. of Tech., Lexington.
PERFORMANCE OF BAYES-OPTIMAL ANGLE-OF-ARRIVAL ESTIMATORS
F. M. White 13 Aug. 1984 76 p
(Contract F19628-80-C-0002)
(AD-A146594; TR-654; ESD-TR-84-028) Avail: NTIS HC A05/MF A01 CSCL 12/1

The angle-of-arrival estimation problem for waves incident upon a sensor array was examined through a Monte Carlo evaluation of the performance of the Bayes-optimal MAP (maximum aposteriori) and MMSE (minimum mean square error) estimators. The case of two independent wave emitters of known powers as well as a multiple look, Gaussian signal in Gaussian noise statistical model were assumed. The Cramer-Rao bound on the estimator's rms error was computed for comparison. The evaluation proceeded with the computation of MAP and MMSE angle estimates for 1000 random samples of array outputs and the accumulation of their rms errors. The probability of detecting both emitters with the optimal detector was also accumulated. This was done for .1, .03, and .01 beamwidths emitter separations and a range of signal-to-noise ratios (SNRs). The accuracy of the computations was assured through a simple finite grid approximation for the estimates, with no covergence problems, and through the evaluation of statistical confidence intervals for the Monte Carlo data. Additional results included properties of the aposteriori probability density and an analytical computation of the performance of the known angles-of-arrival optimal detector. GRA

N85-15455# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.
SIMPLIFIED CONTINUED FRACTION CALCULATION OF SPHERICAL BESSEL FUNCTIONS
W. J. Lentz Sep. 1984 20 p
(DA Proj. 1L1-62111-AH-71)
(AD-A146644; ERADCOM/ASL-TR-0152) Avail: NTIS HC A02/MF A01 CSCL 12/1

A new technique of generating spherical Bessel functions of real or complex argument is developed. A negative simple continued fraction is defined and error corrections developed for the calculation of the continued fraction. FORTRAN IV programs for spherical Bessel functions of real and complex argument are presented. The technique is simple, test, and of higher accuracy than comparable techniques currently in use to evaluate spherical Bessel functions. Author (GRA)

N85-15456# Rensselaer Polytechnic Inst., Troy, N. Y. Chemical and Environmental Engineering.
DISTRIBUTIONS OF EXTREME VALUES OF SEQUENCES OF AUTOCORRELATED RANDOM VARIABLES Final Technical Report
C. S. Hirtzel Jun. 1984 118 p refs
(Grant NSF CEE-81-05941)
(PB84-240746; NSF/CEE-84011) Avail: NTIS HC A06/MF A01 CSCL 12A

Research on the probabilistic/statistical analyses of extreme values of environmental phenomena such as air pollutant concentrations, water quality, and natural hazards is summarized. Statistical descriptors and characteristics of the maximum value of independent random variables are discussed, and parameters of the extreme value distributions are evaluated for several initial distributions. Extreme values of sequences of autocorrelated random variables are also examined, and statistical descriptors such as the distribution function of the maximum (and its moments) of dependent sequences are derived analytically. The use of computer experiments to analyze extreme phenomena is explored, with a focus on their use in quantifying the effect of dependence in the underlying sequence on the statistical/mathematical properties of the extreme values. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N85-15457# Stanford Univ., Calif. Dept. of Statistics.
LOG LINEAR MODEL APPLICATIONS
H. Solomon 30 Aug. 1984 30 p Presented at the 1st Pacific Area Statistical Conference Tokyo, Dec. 1982
(Contract N00014-76-C-0475)
(AD-A146620; SU-TR-349) Avail: NTIS HC A03/MF A01 CSCL 12/1

Methods for multivariate data analysis have been developed and received wide usage in the past 30 years. The advent of the computer in the early 1950's made possible an acceleration in the number of multivariate studies. The first to profit was factor analysis which became a commonplace in exploratory studies. Subsequently, linear discriminant analysis, classification methods and then cluster analyses became part of the emerging excitement in attempting and doing studies either not considered possible before or not thought about at all before because of the lack of computer resources. Another multivariate method has also profited from the computer era. It is multidimensional contingency table analysis through use of the log-linear model. This document looks at some applications of the log-linear model, or as it sometimes is called, logistic response analysis. It may be instructive to view one situation explored about 25 years ago through classification techniques before computer capability to handle the log-linear model and software was available, and then analyze the same data base by contingency table analysis. After this comparison, other and more recent direct applications of the log-linear model are discussed. GRA

N85-15458# Stanford Univ., Calif. Dept. of Statistics.
EFFICIENT SCORES, VARIANCE DECOMPOSITIONS AND MONTE CARLO SWINDLES
I. Johnstone and P. Velleman 28 Aug. 1984 47 p
(Contract N00014-76-C-0475)
(AD-A146673; SU-TR-348) Avail: NTIS HC A03/MF A01 CSCL 12/1

Monte Carlo swindles or variance reduction techniques exploit the experimenter's knowledge of the stochastic structure governing the simulated data to construct more precise estimates of unknown parameters. Alternatively, one can reduce the number of replications (and thus the cost) needed to gain a desired level of precision. This paper reviews the common case of swindles based on variance decompositions for estimating efficiencies and variances of location and regression estimators. It then proposes a new swindle based on Fisher's efficient score function that can be applied to a much wider range of situations than can the Gaussian-over-independent swindles used in many studies of robust estimators. The authors compare these methods by performing simulations for the efficiencies of location estimates and by placing them in a simple geometric framework. They illustrate the use of the score function swindle in estimating the variances of Pitman estimates of location for samples from the t-distribution at selected degrees of freedom. Finally, applications to scale estimation, exponential regression, statistical decision theory, and bootstrap computations are sketched. Author (GRA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N85-15459 United Kingdom Atomic Energy Authority, Risley (England).
ANALYSIS OF THE IMPACT OF A DEFORMABLE MISSILE MODEL ON A DEFORMABLE OBSTRUCTION
K. Drittler, P. Gruner, and J. Krivy 5 Jul. 1984 30 p refs Transl. into ENGLISH of "Berechnung des Stosses eines Deformierbaren Flugkorpermodells Gegen ein Deformierbares Hindernis" rept. IRS-W-20 Inst. fuer Reaktorsicherheit, Cologne, Apr. 1976
(BLL-Risley-Tr-8534-(9091.9F); IRS-W-20) Avail: British Library Lending Div., Boston Spa, Engl.

A formalism based on Riera's model is presented, by means of which impact forces upon a deformable target, i.e., a target which yields during impact, can be calculated. (However, perforation of the target is excluded.) This method is applied to the crashing of a fast-flying military airplane impacting with various velocities. It is assumed that during impact the target yields up to 0.5 meter. The comparison with other calculations on the basis of rigid targets shows that the prescribed motion of the target only slightly affects the magnitude of the impact force. Author

N85-15460# Technische Univ., Vienna (Austria).
ANISOTROPY AND MICROSTRUCTURE OF RARE EARTH PERMANENT MAGNET MATERIALS Semiannual Report, Jan. - Jun. 1984
J. Fidler, R. Groessinger, H. Kirchmayr, and P. Skalicky Jun. 1984 60 p
(Contract DAJA45-84-C-0010)
(AD-A146549; R/D-4060-R-MS; SAR-1) Avail: NTIS HC A04/MF A01 CSCL 20/3

Recently a new family of hard magnetic materials based on Nd-Fe-B was developed. With these compounds permanent magnets with energy products up to 40 MGOe were produced. The greater abundance of Nd combined with the low price for Fe are a hope for producing high qualitative, low cost magnets in the future. Therefore large scale applications are proposed for Nd-Fe-B magnetic. The aim of the scientific part of the present report will be the investigation of the low temperature physical properties of this new family of compounds. GRA

N85-14988# Joint Publications Research Service, Arlington, Va.
CONTROLLABLE ROTATION OF SYSTEM OF TWO SOLID BODIES WITH ELASTIC ELEMENTS Abstract Only
V. Ye. Berbyuk *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 49 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 238-246 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14989# Joint Publications Research Service, Arlington, Va.
MOTION OF HEAVY SYMMETRIC BODY WITH FLEXIBLE BARS ABOUT STATIONARY POINT Abstract Only
V. G. Vilke *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 50 Transl. into ENGLISH from Prikl. Mat. i Mekhan. (Moscow), v. 48, no. 2, Mar.-Apr. 1984 p 233-237 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N85-15461# Colorado School of Mines, Golden. Center for Wave Phenomena.
AN EXTENSION OF THE BORN INVERSION METHOD TO A DEPTH DEPENDENT REFERENCE PROFILE
N. Bleistein and S. H. Gray 1 Aug. 1984 74 p
(Contract N00014-84-K-0049)
(AD-A146469; CWP-007) Avail: NTIS HC A04/MF A01 CSCL 20/1

The purpose of this paper is to describe an extension of the multidimensional Born inversion technique (Cohen and Bleistein, 1979a) for acoustic waves. In that earlier work, a perturbation in reference soundspeed was determined by assuming that the reference or background speed was constant. In this extension, we allow the reference speed to be a function of the depth variable, z, but still require that it be independent of the transverse variables. The output of this method is a high frequency bandlimited reflectivity function of the subsurface. The reflectivity function is an array of bandlimited singular functions scaled by the normal reflection strength. Each singular function is a Dirac delta function of a scalar argument which measures distance normal to a reflecting interface. Thus, the reflectivity function is an indicator map of subsurface reflectors which is equivalent to the map produced by migration. In addition to the assumption of small perturbation, the method requires the assumption that the reflection data reside in the high frequency regime, in a well-defined sense. GRA

N85-15462# Eagle Technology, Inc., Orlando, Fla.
HUMAN ENGINEER'S GUIDE TO AUDITORY DISPLAYS. VOLUME 2: ELEMENTS OF SIGNAL RECEPTION AND RESOLUTION AFFECTING AUDITORY DISPLAYS Report, 1980 - 1982
B. E. Mulligan, L. S. Goodman, D. K. McBride, T. M. Mitchell, and T. N. Crosby Aug. 1984 152 p
(Contract N61339-80-D-0011)
(AD-A146513; NAVTRAEQUIPC-80-D-0011/0037-2) Avail: NTIS HC A08/MF A01 CSCL 17/1

This work reviews the areas of monaural and binaural signal detection, auditory discrimination and localization, and reaction times to acoustic signals. The review was written from the perspective of human engineering and focuses primarily on auditory processing of information contained in acoustic signals. The impetus for this effort was to establish a data base to be utilized in the design and evaluation of acoustic displays. Appendix 1 also contains citations of the scientific literature on which was based the answers to each question. There are nineteen questions and answers, and more than two hundred citations contained in the list of references given in Appendix 2. This is one of two related works, the other of which reviewed the literature in the areas of auditory attention, recognition memory, and auditory perception of patterns, pitch, and loudness. GRA

N85-15463# Texas Univ., Austin. Austin Applied Research Lab.
WAVE-WAVE INTERACTIONS, MICROSEISMS, AND INFRASONIC AMBIENT NOISE IN THE OCEAN
A. C. Kibblewhite and K. C. Ewans 16 Aug. 1984 87 p
(AD-A146529; ARL-TR-84-2) Avail: NTIS HC A05/MF A01 CSCL 20/1

This particular work was initiated following a review of the current literature covering the ambient noise field at very low frequencies. The sparsity of good published data and the continuing interest in low frequency ambient noise have prompted this effort at this time. This report is intended to be the first in a series of contributions to the subject which will be submitted for publication in the near future from reports prepared in recent years at Applied Research Laboratories, The University of Texas (ARL:UT). In this report, correlations of wave climate and ocean induced microseism activity detected by a land-based sensor are examined. The quality of the data, the long term nature of the observations, and a unique property of the geographical region under investigation have helped clarify the role of nonlinear wave-wave interactions in ocean wave and ocean noise processes. GRA

N85-15464# Eagle Technology, Inc., Orlando, Fla.
HUMAN ENGINEER'S GUIDE TO AUDITORY DISPLAYS. VOLUME 1. ELEMENTS OF PERCEPTION AND MEMORY AFFECTING AUDITORY DISPLAYS Technical Report, 1980 - 1982
B. E. Mulligan, L. S. Goodman, D. K. McBride, T. M. Mitchell, and T. N. Crosby Aug. 1984 124 p
(Contract N61339-80-D-0011)
(AD-A146601; NAVTRAEQUIPC-80-D-0011/0037-1) Avail: NTIS HC A06/MF A01 CSCL 17/1

This work reviews the areas of auditory attention, recognition, memory and auditory perception of patterns, pitch, and loudness. The review was written from the perspective of human engineering and focuses primarily on auditory processing of information contained in acoustic signals. The impetus for this effort was to establish a data base to be utilized in the design and evaluation of acoustic displays. GRA

N85-15465# Tennessee Univ., Knoxville. Dept. of Physics and Astronomy.
THEORY OF HARMONIC GENERATION OF FINITE AMPLITUDE ULTRASONIC WAVES IN SOLIDS OF HEXAGONAL SYMMETRY Interim Report
J. Philip and M. A. Breazeale Oct. 1984 69 p
(Contract N00014-81-K-0229; DA Proj. RR0-1108)
(AD-A146636; TR-22) Avail: NTIS HC A04/MF A01 CSCL 12/1

The Technical Report gives a complete analysis of the theory of propagation of a finite amplitude ultrasonic wave in a nonlinear crystal of hexagonal symmetry along the symmetry axis and along any direction in the basal plane. From the theory we conclude that at least four of the ten third order elastic constants can be evaluated from harmonic generation measurements in the appropriate directions in hexagonal crystals. GRA

N85-15466# Washington State Univ., Pullman.
RESEARCH ON ACOUSTICAL AND OPTICAL SCATTERING, OPTICS OF BUBBLES, DIFFRACTION CATASTROPHES, LASER GENERATION OF SOUND, AND SHOCK INDUCED CAVITATION Annual Summary Report, 1 Jul. 1983 - Sep. 1984
P. L. Marston Sep. 1984 6081 p
(Contract N00014-80-C-0838; DA Proj. RR0-1108)
(AD-A146703; ASR-4) Avail: NTIS HC A05/MF A01 CSCL 20/1

The research summarized concerns a variety of phenomena associated with the propagation and scattering of acoustical, optical, and shock waves. The topics considered fall under the following four categories: (1) Acoustical scattering theory and experiments (focused backscattering from spheres due to transmitted wave and Rayleigh wave acoustical glories, nearfield effects in acoustic scattering, backscattering from a torus, and distortion of focused pulses); (2) Scattering of light from bubbles in liquids and other problems in electromagnetic scattering of value to acoustics and naval technology (critical-angle scattering of light from bubbles, strong cross-polarization in near-forward and backward scattering from bubbles, optical measurement of the amplitude of radial oscillations of bubbles, an optical retro-reflector for use in water, a novel hyperbolic-umbilic diffraction catastrophe, and radiation torques on spheres); (3) Characterization of sound generated in water by modulated laser beams (production by a pre-existent bubble in water, radiation pressure, and heating in water); and (4) Rapid cavitation induced by the reflection of shock waves. Author (GRA)

N85-14972# Joint Publications Research Service, Arlington, Va.
RESONANT SCATTERING OF ACOUSTIC WAVES BY ELASTIC SPHERICAL SHELL IN FLUID Abstract Only
A. P. Poddubnyak *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 38 Transl. into ENGLISH from Akust. Zhurnal (Moscow), v. 30, no. 1, Jan.-Feb. 1984 p 89-95 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-15238# Joint Publications Research Service, Arlington, Va.
LONG-DISTANCE PROPAGATION OF INFRASOUND IN ATMOSPHERE NEAR EARTH'S SURFACE Abstract Only
G. A.202Grachev Bush, A. I., S. N. Kulichkov, A. K. Matveyev, and M. I. Mordukhovich *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 142 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 309-311 Original language document was announced in IAA as A84-34446 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15239# Joint Publications Research Service, Arlington, Va.
STUDY OF LOW-FREQUENCY SOUND WITH POINT SOURCE IN STREAM WITH SHEAR Abstract Only
V. P. Goncharov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 142 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 312-314 Original language document was announced in IAA as A84-34447 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15243# Joint Publications Research Service, Arlington, Va.
ACTUAL ALTITUDES OF RADIOACOUSTIC SOUNDING IN DECIMETER WAVELENGTH BAND Abstract Only
V. D. Belyavskaya, M. A. Kallistratova, G. A. Karyukin, and I. V. Petenko *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 145 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmosfery i Okeana (Moscow), v. 20, no. 4, Apr. 1984 p 250-254 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N85-15467# Lehigh Univ., Bethlehem, Pa. Center for Solid State Studies.
CHARGE TRAPPING IN LOW TEMPERATURE MOS (METAL-OXIDE-SILICON) OXIDES Technical Progress Report, 26 Oct. 1980 - 25 Apr. 1984
M. E. Zvanut, F. J. Feigl, S. R. Butler, and R. H. Vogel 24 Aug. 1984 50 p
(Contract DAAG29-81-K-0007)
(AD-A146450; ARO-17439.2-MS) Avail: NTIS HC A03/MF A01 CSCL 20/8

Metal-oxide-silicon (MOS) capacitors were fabricated on silicon dioxide films produced at 700 C by either low pressure chemical vapor deposition (LPCVD) or high pressure thermal oxidation (HIPOX). The LPCVD process involved reaction of dichlorosilane with nitrous oxide. The HIPOX process involved dry oxygen. The LPCVD and HIPOX films were subjected to a variety of annealing treatments. We have systematically investigated the effects of these treatments by measurement of oxide charge and interface trap density before and after electron current transport across films, grown and annealed at 700 C, were comparable to those of standard dry thermal oxides grown and annealed at 1000 C.

However, charge trapping in the HIPOX films was an order of magnitude larger than in the standard oxides, although well-prepared HIPOX films exhibited specific electron traps characteristics of standard dry oxides. GRA

N85-15468# Colorado State Univ., Fort Collins.
ELECTRONIC TRANSPORT PROCESSES IN REFRACTORY METAL SILICIDES Final Report, 8 Jan. 1981 - 30 Jun. 1984
J. E. Mahan 22 Aug. 1984 25 p
(Contract DAAG29-81-K-0151)
(AD-A146495; ARO-18198.11-MS) Avail: NTIS HC A02/MF A01 CSCL 20/8

The electronic transport properties of TiSi2, TaSi2, MoSi2, and WSi2 thin films were investigated. The films were prepared by neutralized ion beam sputtering of the metals onto silicon surfaces, followed by furnace reaction in an inert atmosphere to form the disilicide film. X-ray diffraction and Auger analysis indicate that single-phase disilicide films were obtained, with no detectable impurity content. The residual and intrinsic resistivity components were determined. Hall effect and magnetoresistance measurements were made to determine the dominant carrier type and obtain representative mobility estimates. It was found that multicarrier effects prevail in all of the materials. Author (GRA)

N85-15469# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ANISOTROPY AND RELAXATION EFFECTS OF Co2+ IONS IN LITI FERRITE
G. F. Dionne 15 Aug. 1984 72 p
(Contract F19628-80-C-0002)
(AD-A146550; TR-688; ESD-TR-84-034) Avail: NTIS HC A04/MF A01 CSCL 20/3

Microwave power absorption and hysteresis loops were studied on a series of ferrite materials prepared from a standard LiTi spinel host with Co(2+) additions in amounts up to 0.05 ions per formula unit. Experimental results over this concentration range indicate that the rapid relaxation of Co(2+) causes X-band pek power thresholds to increase by a factor of more than 100 and magnetic loss parameters by a factor greater than ten. The usual strong effects of Co(2+) positive magnetic anisotropy, however, were not found in either ferrimagnetic resonance linewidths or hysteresis loop parameters. As a consequence, it is concluded that peak power thresholds can be raised substantially by Co(2+) additions with a modest penalty in magnetic loss, but without the catastrophic deterioration of the hysteresis loop observed previously in undiluted lithium ferrite. GRA

N85-15470# Texas A&M Univ., College Station. Dept. of Physics.
TOPICS IN HIGH RESOLUTION SPECTROSCOPY OF STORED IONS
H. A. Schuessler 1984 30 p refs Sponsored in part by NSF
(Contract DE-AS05-80ER-10578)
(DE85-002093; DOE/ER-10578/T4) Avail: NTIS HC A03/MF A01

Recent developments in stored ion spectroscopy are discussed with emphasis on the following aspects: (1) very high resolution experiments; (2) precision spectroscopy of one-electron ions; (3) measurement of the magnetic moment of the bound electron; and (4) feasibility of external ion injection to extend ion storage techniques to highly charged and possibly radioactive ions. The question of what can be learned from these experiments about nuclear structure and quantum electrodynamical contribution to the hyperfine interaction and the atomic Zeeman effect is addressed. DOE

N85-15471# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
STRUCTURE OF ADSORBED MONOLAYERS. THE SURFACE CHEMICAL BOND
G. A. Somorjai and B. E. Bent Jun. 1984 69 p refs Presented at the 8th Scand. Symp. on Surface Chem., Lund, Sweden, 4-6 Jun. 1984
(Contract DE-AC03-76SF-00098)
(DE84-016879; LBL-18011; CONF-8406199-1) Avail: NTIS HC A04/MF A01

A summary of what was learned about the structure of adsorbed monolayers and about the surface chemical bond from molecular surface science is provided. While the surface chemical bond is less well understood than bonding of molecules in the gas phase or in the solid state, knowledge of its properties is rapidly accumulating. The information obtained also has great impact on many surface science based technologies, including heterogeneous catalysis and electronic devices. It is hoped that much of the information obtained from studies at solid-gas interfaces can be correlated with molecular behavior at solid-liquid interfaces. DOE

N85-15472# Sandia Labs., Albuquerque, N. Mex. Plasma Theory Div.
ELECTRON BEAM PROPAGATION ALONG CHARGED FOILS
J. W. Poukey and J. R. Freeman Sep. 1984 12 p refs
(Contract DE-AC04-76DP-00789)
(DE85-002137; SAND-84-1816) Avail: NTIS HC A02/MF A01

An electrically isolated metal disc or foil is proposed as a method for transporting cylindrically convergent high-power electron beams in vacuum to a central target. Examples of 2-D PIC computations are shown for PBFA-X parameters. The results demonstrate the validity of the basic idea but scattering in the foil or mesh might limit the minimum focal radius for some parameters. DOE

N85-15473# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
STRUCTURE DETERMINATION OF MOLECULAR ADSORBATES WITH DYNAMICAL LEED AND HREELS
M. A. VanHove Aug. 1984 11 p refs Presented at the 1st Intern. Conf. on Struct. of Surfaces (ICSOS), Berkeley, Calif., 13-16 Aug. 1984 Sponsored in part by NSF-Italy Cooperative Science Grant and a NATO Exchange Grant
(Contract DE-AC03-76SF-00098)
(DE85-002007; LBL-18080; CONF-840821-4) Avail: NTIS HC A02/MF A01

Molecular adsorbate structures are determined by combined Low-Energy Electron Diffraction (LEED) with High-Resolution Electron Energy Loss Spectroscopy (HREELS). The HREEL vibrational spectroscopy identifies the molecular species, whose bond lengths and angles are obtained by LEED. Appropriate calculational methods are required in LEED to sole complex molecular structures: such methods will be discussed for large molecules, for large unit cells and for disordered adsorbates. Results were obtained for the following molecular species adsorbed on several low-Miller-index metal surfaces: CO, O2H2 (YIELDS) CCH3, C3H4 (YIELDS) CCH2CH3, and C6H6. The presently available methods should be capable of solving a multitude of molecular adsorbate structures, including large molecules, coadsorbates and disordered species. DOE

N85-15474# Texas A&M Univ., College Station. Dept. of Physics.
PROGRESS IN NUMERICAL CALCULATIONS OF ION-ATOM COLLISIONS
J. F. Reading, A. L. Ford, J. S. Smith, J. Alexander, and R. L. Becker (ORNL) 1983 16 p refs Presented at the 3rd Workshop on Inner Shell Ionization by Light Ions, Linz, Austria, 4 Aug. 1983
(Contract DE-AC05-84ER-21400)
(DE84-016598; CONF-8308173-3) Avail: NTIS HC A02/MF A01

Numerical coupled channel calculations of ionization cross sections were performed. They indicate that the Brandt treatment over estimates cross sections at low energies. DOE

N85-15475# Oak Ridge National Lab., Tenn.
ELECTRON CAPTURE BY MULTIPLY CHARGED IONS FROM HYDROGEN ATOMS AT LOW ENERGIES
R. A. Phaneuf 1983 7 p refs Presented at 8th Intern. Seminar on Ion-Atom Collisions, Utrecht, 4 Aug. 1983
(Contract DE-AC05-84OR-21400)
(DE84-016560; CONF-8308192-1) Avail: NTIS HC A02/MF A01

At collision velocities which are slow compared to the motion of the ls hydrogenic electron, electron capture by multiply charged ions from hydrogen atoms is best characterized in terms of a quasimolecular model for the interaction. The capture process is represented as a transition between the stationary states of the quasimolecule. Predicted cross sections depend strongly on the internuclear distance at which the relevant potential energy curves have minimum separation, or cross, and on the dynamics of the coupling between the stationary states. DOE

N85-15476# Fermi National Accelerator Lab., Batavia, Ill.
FERMILAB RESEARCH PROGRAM WORKBOOK
Roy Rubinstein May 1983 126 p
(Contract DE-AC02-76CH-00016)
(DE84-012568; DOE/CH-00016/T3) Avail: NTIS HC A07/MF A01

The Fermilab Research Program Workbook was produced annually for the past several years, with the original motivation of assisting the Physics Advisory Committee in its yearly program review conducted during its summer meeting. While this is still the primary goal, the Workbook is increasingly used by others needing information on the current status of Fermilab experiments, properties of beams, and short summaries of approved experiments. At the present time, considerable changes are taking place in the facilities at Fermilab. The end of the physics program using the 400 GeV Main Ring, which is now relegated to be just an injector for the soon to be commissioned Tevatron is reached. In addition, the experimental areas are in the midst of a several year program of upgrading to 1000 GeV capability. Several new beam lines will be built in the next few years; some indications can be given of their properties, although with the caveat that designs for some are by no means final. Already there is considerable activity leading to experiments studying anti p p collisions at (RADICAL)s = 2000 GeV. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N85-15477# California Univ., Livermore. Lawrence Livermore Lab.
ATA PROBE BEAM EXPERIMENT
E. J. Lauer, Y. P. Chong, D. S. Prono, and J. T. Weir 18 Jun. 1984 7 p refs Presented at DARPA Propagation Meeting, Monterey, Calif., 18 Jun. 1984
(Contract W-7405-eng-48)
(DE84-016017; UCRL-91399; CONF-84016017) Avail: NTIS HC A02/MF A01

The philosophy of these tests is to measure the motion of a low current, small diameter electron beam in the accelerator before running high current. By using low current, particle motion is studied in the applied fields without any extra complications associated with the self-forces of high currents. With the steering magnets off, the transverse drift of the probe beam was measured. Also, the probe beam was used to optimize the current in the steering magnets to compensate for the drift. There were concurrent efforts to locate the source of the error field which is presumed to cause the drift. So far, the source was not established but the search is continuing. DOE

74 OPTICS

Includes light phenomena.

N85-15478 Department of the Army, Washington, D. C.
DUAL-SECONDARY MIRROR CASSEGRAIN OPTICAL SYSTEM Patent
O. D. Christy, inventor (to Army) Issued 27 Mar. 1984 6 p
(AD-D011273; US-Patent-4,439,012; US-Patent-Appl-SN-338695; US-Patent-Class-350-294) Avail: US Patent and Trademark Office CSCL 20/6

The dual-secondary mirror optical system utilizes, in principle, the Cassegrain optical system. An apertured, single, primary mirror is coaxially aligned with two secondary mirrors to provide coaxial transmit and receive optical paths. Separation of the optical paths is in radial distance from the central optical axis. An apertured secondary mirror in conjunction with the primary mirror detects the transmitted beam, providing a hollow expanded output beam. The other secondary mirror in conjunction with the primary mirror directs received radiation coaxially within and spatially separated from the hollow transmitted beam, providing dual transmit receive operation. Author (GRA)

N85-15479*# United Technologies Research Center, East Hartford, Conn.
ADVANCED INFRARED LASER MODULATOR DEVELOPMENT Final Report
P. K. Cheo, R. Wagner, and M. Gilden Dec. 1984 58 p refs
(Contract NAS1-16904)
(NASA-CR-172479; NAS 1.26:172479; R83-925985-6) Avail: NTIS HC A04/MF A01 CSCL 20F

A parametric study was conducted to develop an electrooptic waveguide modulator for generating continuous tunable sideband power from an infrared CO_2 laser. Parameters included were the waveguide configurations, microstrip dimensions device impedance, and effective dielectric constants. An optimum infrared laser modulator was established and was fabricated. This modulator represents the state-of-the-art integrated optical device, which has a three-dimensional topology to accommodate three lambda/4 step transformers for microwave impedance matching at both the input and output terminals. A flat frequency response of the device over 20 HGz < or = 3 dB) was achieved. Maximum single sideband to carrier power greater than 1.2% for 20 W microwave input power at optical carrier wavelength of 10.6 microns was obtained. M.G.

N85-15480*# Princeton Univ. Observatory, N. J.
OBLIQUE FOCUS ICCD LABORATORY EVALUATION Final Report, 1 Jul. 1978 - 31 Jan. 1982
Donald G. York 31 Jan. 1982 25 p
(Grant NsG-5277)
(NASA-CR-174205; NAS 1.26:174205) Avail: NTIS HC A02/MF A01 CSCL 20F

An oblique focus intensified charge coupled device (ICCD) was constructed and operated in a vacuum system. Special gratings were obtained and an optical system set up to try to model a candidate UV spectrometer (Milieu Interstellaire et Intergalactique-MISIG), and to produce small enough images to test the theoretical subpixel resolution capability of the ICCD system. The efforts were only partly successful. Based on the results, a similar detector was built and flown successfully on a Princeton rocket program. Author

N85-15481# Naval Surface Weapons Center, White Oak, Md.
CHARACTERIZING X-RAY MACHINES
P. W. Brown Jul. 1984 27 p
(AD-A146532; NSWC/TR-84-146) Avail: NTIS HC A03/MF A01 CSCL 20/6

The objective of this report is to present information in both graphical form and data sheet form for radiographers to use as a guide for characterizing any X-ray machine for any given material capable of being X-rayed. This was accomplished by characterizing the Philips MG 301 Constant Potential X-ray Machine for radiographing various steel thicknesses with a 4.0mm focal spot. The information in this report will permit users of any X-ray machine to develop exposure charts to allow them to make fast and reliable decisions when faced with the problem of developing an exposure technique for radiographing, for example, thicknesses of steel in the range of .125 to 2.5 inches. Information contained in this

report provides users of the Philips MG 301 and other types of X-ray machines with guidelines for developing exposure techniques for other metals (aluminum, copper, etc.) in the thickness range stated above. This can be accomplished by using steel as a cross reference in conjunction with recorded charts of approximate radiographic equivalence factors. GRA

N85-14969# Joint Publications Research Service, Arlington, Va.
DESIGN OF TWO-MIRROR SCANNER WITH AXES OF ROTATION NOT IN PLANE OF MIRRORS Abstract Only
Ye. I. Antonov, A. Tkachev, and V. V. Ridiger *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 31 Transl. into ENGLISH from Optiko-Mekhan. Prom. (Leningrad), no. 2, Feb. 1984 p 29-31 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-14970# Joint Publications Research Service, Arlington, Va.
EFFECT OF ABERRATION IN OPTICAL SYSTEM ON ILLUMINANCE DISTRIBUTION OVER IMAGE OF STRIP IN SEMICOHERENT LIGHT Abstract Only
I. V. Peysakhson and N. M. Maltsev *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 31-32 Transl. into ENGLISH from Optiko-Mekhan. Prom. (Leningrad), no. 2, Feb. 1984 p 27-29 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-15040# Joint Publications Research Service, Arlington, Va.
ELECTROOPTICAL SENSOR FOR AUTOMATIC DETECTION OF OBJECTS
A. L. Andreyev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 52-58 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), v. 27, no. 4, Feb. 1984 p 79-85 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15058# Joint Publications Research Service, Arlington, Va.
ENERGY PARAMETERS OF OPTICAL RADIATION SPACE RESEARCH SYSTEMS Abstract Only
K. Ye. Rumyanstev *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Kiev), v. 27, no. 3, Mar. 1984 p 9-12 (For primary document see N85-15042 06-31)
Avail: NTIS HC A07/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N85-15482# Nagoya Univ. (Japan). Inst. of Plasma Physics.
THE ORIGIN OF PLASMA ROTATION IN THE EARLY PHASE OF AN FRC PRODUCED BY A REVERSED FIELD THETA PINCH
K. Hirano and M. Okamoto Oct. 1984 15 p refs
(IPPJ-698) Avail: NTIS HC A02/MF A01

A hybrid code simulating the early phase of a reversed field theta pinch shows the plasma is radially divided into oppositely rotating two parts during the plasma expansion phase after the shock collapse on the axis. Taking the direction of diamagnetic current to be positive, it was observed that the inner part where vector potential A sub theta is positive rotates in a negative direction, and that the peripheral part having negative A sub theta rotates in a positive direction. These observations are in good agreement with the experimental measurements done in the STP-L apparatus. The radial slitting of the rotation can be understood by the conservations of the total mechanical angular momentum involved in the plasma, and canonical angular momentum along the trajectories of the plasma ions. Author

N85-15483# Nagoya Univ. (Japan). Inst. of Plasma Physics.
GENERATION OF SUPRATHERMAL ELECTRONS DURING PLASMA CURRENT STARTUP BY LOWER HYBRID WAVES IN A TOKAMAK
K. Ohkubo, K. Toi, K. Kawahata, Y. Kawasumi, K. Matsumoto (Yamagata Univ., Japan), K. Matsuoka (Osaka City Univ., Japan), M. Mimura, N. Noda, Y. Ogawa, and K. N. Sato Oct. 1984 13 p refs
(IPPJ-697) Avail: NTIS HC A02/MF A01

Suprathermal electrons which carry a seed current are generated by non-resonant parametric decay instability during initial phase of lower hybrid current startup in the JIPP T-IIU Tokamak. From the numerical analysis, it is found that parametrically excited lower hybrid waves at lower side band can bridge the spectral gap between the thermal velocity and the low velocity end in the pump power spectrum. Author

N85-15484# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ELECTROMAGNETIC ACCELERATION OF MACROPARTICLES TO HYPERVELOCITIES IN AXISYMMETRIC GEOMETRY
Kazunari Ikuta Oct. 1984 15 p refs
(IPPJ-696) Avail: NTIS HC A02/MF A01

An improved version of the plasma impulse accelerator for macroparticles is discussed in detail, overcoming the length limitation of the classical railgun. The acceleration of macroparticles by the use of the plasma brim in the cylindrical electrodes is considered. The principle of the cylinder electrode impulse accelerator is elaborated. A possible accelerator system formed by the arrangement of axially aligned, segmented cylinders as the electrodes is addressed. R.S.F.

N85-15485# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ALPHA-PARTICLE DIAGNOSTICS WITH HIGH ENERGY NEUTRAL BEAMS
M. Sasao and K. N. Sato Sep. 1984 28 p refs
(IPPJ-695) Avail: NTIS HC A03/MF A01

The feasibility of alpha-particle diagnostics was examined using a high energy neutral beam on the R-Tokamak, a planned device at IPP-Nagoya, Japan, for reacting plasma experiments. In this method, injected neutral particles neutralize alpha particles so as to escape from the magnetically confined plasma through double charge exchange processes, He(++) + A(0) yields He(0) + A(++). Requirements for a probing beam are discussed from viewpoints of penetration of an injected beam in the plasma and a neutralization efficiency of alpha particles in a wide velocity range. Either a Li(0) beam or a He(0) beam in the ground state, produced from a negative ion beam is suitable. A method to neutralize a He(-) beam into the ground state through an autodetachment process is proposed. Author

N85-15486# Nagoya Univ. (Japan). Inst. of Plasma Physics.
LIMITS OF POSSIBLE OPERATION OF THE R-TOKAMAK DUE TO IDEAL MHD INSTABILITIES
H. Naitou, K. Yamazaki, Y. Takemoto, Y. Abe (Center de Recherches en Physique des Plasmas, Lausanne, Switzerland), R. Gruber (Center de Recherches en Physique des Plasmas, Lausanne, Switzerland), H. Saurenmann (Center de Recherches en Physique des Plasmas, Lausanne, Switzerland), and F. Troyon Sep. 1984 32 p refs
(IPPJ-694) Avail: NTIS HC A03/MF A01

A series of MHD stability calculations was made with the ERATO code to know the maximum beta which can be expected for the R-Tokamak using the parameters of the second phase design (an aspect ratio of 2.75, ellipticity of 1.8, and triangularity of 0.3). The highest beta obtained under the condition that both the n=1 free boundary mode (with no wall stabilization) and the n=infinity ballooning modes are stable is about 6% at q sub s approximately equal to 2.0 and q sub O at the Mercier limit on axis. This result was found by performing some optimization of the current and pressure profiles. If only the ballooning modes are concerned, the limiting beta becomes 8.6%. The sensitivity of the result to elongation was studied. It was found that the maximum beta increases and then decreases with elongation. The optimum

beta is obtained for an elongation of 1.8 if both the n=1 kink and n=infinity ballooning limits are considered and of 2.0 if only ballooning modes are considered. These results are compared with proposed scaling laws. Author

N85-15487# Nagoya Univ. (Japan). Inst. of Plasma Physics.
A NONLOCAL EXPRESSION FOR THE PONDEROMOTIVE POTENTIAL
Tadatsugu Hatori Oct. 1984 14 p refs
(IPPJ-699) Avail: NTIS HC A02/MF A01

An expression for the ponderomotive potential which is applicable to the case where the scale-length of variation of RF amplitude is comparable to the excursion length and to the Larmor radius is presented. This expression is used to explain the empirical scaling law for the potential. Author

N85-15488# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PROCEEDINGS OF WORKSHOP ON SYNERGISTIC EFFECTS IN SURFACE PHENOMENA RELATED TO PLASMA-WALL INTERACTIONS
Noriaki Itoh, ed., Kohji Kamada, ed., and Hiroyuki Tawara, ed. Oct. 1984 272 p refs Workshop held in Nagoya, Japan, 21-23 May 1984
(IPPJ-AM-35) Avail: NTIS HC A12/MF A01

Articles addressing fundamental surface phenomena related to plasma-surface interactions in fusion devices are presented. Emphasis is given to synergistic effects in hydrogen recycling, surface erosion, and surface composition. For individual titles, see N85-15489 through N85-15497.

N85-15489# Oak Ridge National Lab., Tenn.
SYNERGISTIC EFFECTS IN FUSION MACHINES, SESSION SUMMARY
R. A. Langley, D. Manos (Princeton Plasma Physics Lab.), and J. Roth (Max Planck Inst. of Plasma Physics) *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 1-10 refs (For primary document see N85-15488 06-75)
(Contract DE-AC05-84OR-21400)
Avail: NTIS HC A12/MF A01

A definition of synergistic effects in fusion devices is proposed and anticipated causal agents for such effects are discussed. Two presentations are summarized which describe observation of possible synergistic effects in the area of plasma-wall interactions. Evidence for enhanced erosion on a graphite probe cap during radio frequency heating of the Princeton Large Torus (PLT) is presented. Also, the erosion of graphite in the ASDEX divertor and simultaneous deposition of impurities both with and without neutral beam injection heating is discussed. M.G.

N85-15490# Max-Planck-Inst. fuer Plasmaphysik, Garching (West Germany).
PLASMA SURFACE INTERACTION PROCESSES AND POSSIBLE SYNERGISMS
Rainer Behrisch and J. B. Roberto (ORNL) *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 11-14 refs (For primary document see N85-15488 06-75)
(Contract DE-AC05-84OR-21400)
Avail: NTIS HC A12/MF A01

Experimental approaches to the investigation of plasma-surface interactions in high temperature plasma devices are reviewed. The notion of synergism is introduced to describe wall phenomena where the combined effect of independent processes is significantly different from the individual effects considered separately. It is noted that the contribution of synergistic effects to surface reactions in plasma experiments has not been fully explored. Synergisms related to hydrogen particle balance, impurity release, and mechanical and electromagnetic stresses are described. M.G.

N85-15491# Osaka Univ. (Japan). Dept. of Nuclear Engineering.
SYNERGISMS IN HYDROGEN RECYCLING, SESSION SUMMARY
S. Imoto *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 15-24 (For primary document see N85-15488 06-75)
Avail: NTIS HC A12/MF A01

Two review presentations and several comments on synergisms in hydrogen recycling are summarized. An analytical formalism for evaluating the steady state plasma-driven hydrogen transport was proposed. The formalism included hydrogen trapping, recombination barriers to release at inner and outer surfaces, diffusion and the effect of thermal gradient. The model was applied to the calculation of tritium inventory and permeation for an INTOR class machine. The sources of synergistic effects in Tokamak devices are also reviewed and related to hydrogen recycling. M.G.

N85-15492# Sandia Labs., Albuquerque, N. Mex.
STEADY STATE HYDROGEN TRANSPORT IN SOLIDS
B. L. Doyle and D. K. Brice *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 25-73 refs (For primary document see N85-15488 06-75)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A12/MF A01

The analytical formalism for evaluating the steady state hydrogen (tritium) inventory, recycle and permeation rate and recycle time for surfaces exposed to the plasma of an operating magnetic confinement fusion reactor is reviewed and material relevant to the application of this theory is presented. The formalism includes hydrogen trapping, diffusion, and effects of thermal gradients (e.g., Ludwig-Soret effect), and is applicable for all orders of release kinetics at the inner and outer surfaces. The problem is formulated in terms of a unitless transport parameter, W=(R phi/D)(k sub 1/phi) sup 1/5 where r is the order of the release kinetics, R is the range of the implant, phi is the penetrating part of the incident flux, k sub 1 is the recombination coefficient and D is the diffusion coefficient. The steady state analytical theory is applied to several materials of interest to controlled fusion. M.G.

N85-15493# Max-Planck-Inst. fuer Plasmaphysik, Garching (West Germany).
SYNERGISMS IN SURFACE EROSION, SESSION SUMMARY
J. Bohdansky and J. Roth *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 74-95 refs (For primary document see N85-15488 06-75)
Avail: NTIS HC A12/MF A01

Chemical erosion of graphite under hydrogen ion bombardment and the sputtering of Mo and W by oxygen ions was discussed. The invited contributions are reviewed and the current understanding of the different effects are summarized. The relevance of these to the impurity production in fusion devices is discussed. Author

N85-15494# Toronto Univ. (Ontario). Fusion Research Group.
SYNERGISM IN MATERIALS EROSION DUE TO MULTISPECIES IMPACT
O. Auciello, A. A. Haasz, and P. C. Stangeby *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 96-175 refs (For primary document see N85-15488 06-75)
Avail: NTIS HC A12/MF A01

Plasma-surface interaction phenomena are a subject of major interest because of their relevance in two important technological developments of recent decades, viz, microelectronics and thermonuclear fusion. Work performed to date suggests that similar chemistry may be involved in the erosion process associated with some semiconductor and fusion related materials: SiF_4, $SiCl_4$ and CH_4, are, for example, some of the principal species evolving from Si and C surfaces, causing the observed erosion. In light of the interdisciplinary nature of the subject, experimental and theoretical work on synergistic effects in erosion of both semiconductors and fusion materials are critically reviewed in an attempt to (1) unify concepts related to results and mechanisms proposed

to explain the observed phenomena and (2) explore possible new avenues of research. Author

N85-15495# Kernforschungsanlage, Juelich (West Germany). Projekt Kernfusion.

SYNERGISTIC EFFECTS RELATED TO SURFACE COMPOSITION, SESSION SUMMARY

Wolfgang O. Hofer *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 176-192 refs (For primary document see N85-15488 06-75)

Avail: NTIS HC A12/MF A01

Changes in the surface composition and structure of first wall components in plasma machines initiated by energetic particle bombardment, quantum radiation, d phonon generation in near-surface lattices are discussed. Atomic relocation processes, thermally activated processes, and sorption/desorption phenomena are addressed. M.G.

N85-15496# Argonne National Lab., Ill. Materials Science and Technology Program.

EFFECTS OF MONOLAYER COVERAGES ON SUBSTRATE SPUTTERING YIELDS

D. M. Gruen, A. R. Krauss, and M. J. Pellin *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 193-219 refs Supported in part by DOE (For primary document see N85-15488 06-75)

Avail: NTIS HC A12/MF A01

Materials used or considered for plasma-side applications are not entirely satisfactory, particularly in the medium edge temperature (100 to 300 eV) regime. An approach to impurity control based on self-sustaining surface segregated low-Z layers with high secondary ion fractions was tested in laboratory experiments. A crucial requirement is that substrate sputtering yields be reduced about an order of magnitude by monolayer adsorbate coverages. Theoretical and experimental evidence is adduced to support the contention that overlayer coverages (a monolayer of Li on Cu) result in profound reductions of substrate (e.g., Cu) sputtering yields. The conclusion that a material such as a dilute alloy of Li in Cu could function as a limiter or a divertor plate material is, in part, based on the fact that more than 85% of the sputtered flux originates in the first atomic layer (e.g., Li) of the target. M.G.

N85-15497# Argonne National Lab., Ill. Materials Science and Technology Div.

SYNERGESTIC SPUTTERING PROPERTIES OF BINARY ALLOYS

A. R. Krauss, A. B. DeWald (Georgia Inst. of Technology), D. M. Gruen, and N. Q. Lam *In* Nagoya Univ. Proc. of Workshop on Synergistic Effects in Surface Phenomena Related to Plasma-Wall Interactions Oct. 1984 p 220-254 refs (For primary document see N85-15488 06-75)

Avail: NTIS HC A12/MF A01

It was found that dilute concentrations of lithium in copper produce surfaces which are nearly pure lithium when heated and subject to irradiation. In order to better understand the experimental results, the Cu-Li system was modeled using a modified version of the TRIM computer code and an alloy segregation program. The TRIM code calculates the sputtering yield and dept of origin of the sputtered atoms for materials in which the composition varies from one atomic layer to the next and the segregation program uses these sputtering yields to trace the evolution of the concentration profile. The initial result of sputtering is to preferentially deplete the surface species. Continued irradiation, however, creates a subsurface region of high displacement damage. In the Cu-Li alloy, lithium moves very rapidly through this region, resulting in subsurface lithium enrichment. The enriched region broadens and eventually reaches the surface. The exact effect on the lithium concentration in the first two atomic layers depends on the temperature, damage profile, and particle flux. Results of the calculation are presented, along with a discussion of their implications for fusion reactor materials. M.G.

N85-15498# Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.

THEORETICAL INVESTIGATIONS RELEVANT TO MAGNETIC FUSION RESEARCH, APRIL 1, 1983 - MARCH 31, 1984

Terry Kamash 1984 8 p

(Contract DE-AC02-76ET-53003)

(DE85-001778; DOE/ET-53003/3) Avail: NTIS HC A02/MF A01

Two major objectives were examined: (1) analytical modeling of the Tandem Mirror Experiments; and (2) a study of the stability of the interchange and ballooning modes in EBT with relativistic hot electrons. As may be noted substantial progress was made in both directions. Areas were singled out in which further improvements need and can be made. The results obtaind thus far, and the problems to be addressed in the future are described. DOE

N85-15499# California Univ., Livermore. Lawrence Livermore Lab.

PLASMA-SURFACE INTERACTIONS IN LARGE TANDEM MIRROR DEVICES, MFTF-B

S. L. Allen 7 May 1984 41 p refs Presented at the 6th Intern. Conf. on Plasma Surface Interactions in Controlled Fusion Devices, Nagoya, Japan, 14-18 May 1984

(Contract W-7405-eng-48)

(DE85-001753; UCRL-90160; CONF-840520-19) Avail: NTIS HC A03/MF A01

Present experiments on TMX-U and modeling of MFTF-B indicate that plasma surface interactions can be controlled in MFTF-B. The MFTF-B configuration uses a hot electron population created by ECRH and a sloshing ion population created by neutral beams in the thermal barrier region to create a potential that confines the central cell ions. Neutral beams and ICRH are used to heat the central cell ions. Plasma surface interactions can be minimized at radial surfaces by control of the axial confinement of the edge plasma. Glow discharge cleaning, titanium gettering, and control of the gas from neutral beams are planned for use in wall conditioning and in reducing the background gas pressure. The shielding efficiency of the plasma edge was modeled in MFTF-B by comparing computer codes with current experimental measurements. It is proposed that plasma edge scrapers, diverter like devices, and direct conversion equipment be located in the end region. Finally, MFTF-B is also planning to test some technological issues that are relevant to reactors: superconducting magnet systems and nearly steady state (30-s) operation. DOE

N85-15500# TRW Energy Systems Group, Redondo Beach, Calif.

SPECIAL TOPICS REPORTS FOR THE REFERENCE TANDEM MIRROR FUSION BREEDER: LIQUID METAL MHD PRESSURE DROP EFFECTS IN THE PACKET BED BLANKET, VOLUME 1

T. J. McCarville, D. H. Berwald (GA Technologies, Inc., San Diego, Calif.), and C. P. C. Wong Sep. 1984 44 p refs

(Contract W-7405-eng-48)

(DE85-002142; UCID-20166-Vol-1) Avail: NTIS HC A03/MF A01

Magnetohydrodynamic (MHD) effects which result from the use of liquid metal coolants in magnetic fusion reactors include increases in the primary loop pressure drop and the hydrostatic pressure at the first wall of the blanket. In the reference fission-suppressed tandem mirror fusion breeder design concept the MHD pressure drop in flowing the liquid lithium coolant through an annular packed bed of beryllium/thorium pebbles is directly related to the required first wall structure thickness. As such, it is a major concern which directly impacts fissible breeding efficiency. Consequently, an improved model for the packed bed pressure drop was developed. By considering spatial averages of electric fields, currents, and fluid flow velocities the general equations were reduced to simple expressions for the pressure drop. An energy approach was used to bound the possible values of the constant, and thus the pressure drop. A survey of existing test facilities is presented. R.S.F.

N85-15501# California Univ., Livermore. Lawrence Livermore Lab.

MEASUREMENT OF PROTON AUTONEUTRALIZATION POTENTIAL

Manuel Garcia Sep. 1984 14 p refs Presented at the 5th APS Topical Conf. on High Temperature Plasma Diagnostics, Tahoe City, Calif., 16-20 Sep. 1984
(Contract W-7405-eng-48)
(DE85-001752; UCRL-91330; CONF-840922-2) Avail: NTIS HC A02/MF A01

A proton space charge having multi-MeV kinetic energy was injected through a thin ground plane to extract electrons and produce a time pendent autoneutralization space potential. An electron emitting floating potential resistive divider was used to measure the space potential during 20 nsec of the proton current pulse. During this time, proton kinetic energy fell from 10.6 MeV to 8.5 MeV and thus the space potential (taken as 1.09 x the floating potential) fell from 5.8 kV to 4.6 kV. DOE

N85-15502# Texas Univ., Austin. Inst. for Fusion Studies.
SHEAR-ALFVEN DYNAMICS OF TOROIDALLY CONFINED PLASMAS, PART A
R. D. Hazeltine and J. D. Meiss Aug. 1984 173 p 2 Vol.
(Contract DE-FG05-80ET-53088)
(DE85-001590; DOE/ET-53088/154-Pt-A) Avail: NTIS HC A08/MF A01

Recent developments in the stability theory of toroidally confined plasmas are reviewed. A class of low-frequency, electromagnetic disturbances that seem especially pertinent to modern high-temperature confinement experiments are reviewed. Such disturbances are best unified and understood through consideration of a single, exact fluid moment: the shear-Alfven law. Appropriate versions of this law and its corresponding closure relations are derived and applied in a variety of mostly linear contexts. Among the specific topics considered are: flux coordinates (including Hamada coordinates), the Newcomb solubility condition, Shafranov geometry, magnetic island evolution, reduced MHD and its generalizations, drift-kinetic electron response, classical tearing, twisting, and kink instabilities, pressure-modified tearing instability ((DELTA)-critical), collisionless and semi-collisional tearing modes, the ballooning representation in general geometry, ideal ballooning instability, Mercier criterion, near-axis expansions, the second stability region, and resistive and kinetic ballooning modes. The fundamental importance of toroidal topology and curvature is stressed. DOE

N85-15503# Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
THEORETICAL INVESTIGATIONS RELEVANT TO MAGNETIC FUSION RESEARCH
Terry Kammash 1984 14 p refs
(Contract DE-AC02-76ET-53003)
(DE85-001777; DOE/ET-53003/2) Avail: NTIS HC A02/MF A01

Studies involving the following topics are discussed: tandem mirrors, Elmo bumpy torus physics, and compact torus transport theory. The results of past research and the proposed work in each area are given. R.S.F.

N85-15504# Texas Univ., Austin. Inst. for Fusion Studies.
SHEAR-ALFVEN DYNAMICS OF TOROIDALLY CONFINED PLASMAS, PART B
R. D. Hazeltine and J. D. Meiss Aug. 1984 160 p refs 2 Vol.
(Contract DE-FG05-80ET-53088)
(DE85-001787; DOE/ET-53088/154-Pt-B) Avail: NTIS HC A08/MF A01

Radial boundary layer theory and the eikonal theory of pressure driven modes are covered. DOE

N85-15505# California Univ., Livermore. Lawrence Livermore Lab.
WAVELENGTH SCALING OF LASER PLASMA COUPLING
W. L. Kruer 3 Nov. 1983 25 p refs Presented at the Spring Coll. on Radiation in Plasmas, Trieste, Italy, 24 May - 17 Jun. 1983 Submitted for publication
(Contract W-7405-eng-48)
(DE84-014637; UCRL-89981; CONF-8305127-5) Avail: NTIS HC A02/MF A01

The use of shorter wavelength laser light which enhances collisional absorption and reduces deleterious collective plasma effects is discussed. Coupling processes which are important in reactor size targets are reviewed. The intensity wavelength regime in which collisional absorption is estimated and collective effects are minimized. DOE

N85-14794# Joint Publications Research Service, Arlington, Va.
MEASUREMENTS OF X-RAY SPECTRA FROM LASER PRODUCED PLASMA
Yang Jianguo and Li Ruolan *In its* China Rept.: Sci. and Technol. (JPRS-CST-84-042) 17 Dec. 1984 p 33-42 refs Transl. into ENGLISH from Hejubian Yu Dengliziti Wuli (Chongqing), v. 4, no. 2, 15 Jun. 1984 p 102-107 (For primary document see N85-14789 06-01)
Avail: NTIS HC A06/MF A01

N85-14958# Joint Publications Research Service, Arlington, Va.
PASSIVE STABILIZATION OF VERTICAL INSTABILITY IN TOKAMAK REACTOR Abstract Only
S. G. Bespoludennov, S. A. Galkin, L. M. Degtyarev, and V. I. Pistunovich *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 9 Transl. into ENGLISH from Atomnaya Energiya (Moscow), v. 56, no. 4, Apr. 1984 p 210-212 (For primary document see N85-14954 06-31)
Avail: NTIS HC A04/MF A01

N85-15225# Joint Publications Research Service, Arlington, Va.
MECHANISM OF DAMPING OF PLASMA OSCILLATIONS IN INITIAL STAGE OF INJECTION OF ELECTRON BEAMS FROM SPACECRAFT INTO IONOSPHERE IN ACTIVE EXPERIMENTS Abstract Only
V. A. Fedorov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 134 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 205-210 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15231# Joint Publications Research Service, Arlington, Va.
ELECTRIC FIELD IN PLASMA LAYER OF MAGNETOSPHERE DURING PRELIMINARY SUBSTORM PHASE Abstract Only
V. A. Sergeyev *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 138 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 237-241 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N85-15506# Brown Univ., Providence, R. I. Dept. of Chemistry.
PREPARATION AND ELECTRONIC PROPERTIES OF MoS(2) AND WS(2) SINGLE CRYSTALS GROWN IN THE PRESENCE OF COBALT
D. M. DAmbra, J. V. Marzik, R. Kershaw, J. Baglio, and K. Dwight 21 Sep. 1984 6024 p Prepared in cooperation with GTE Labs., Waltham, MA
(Contract N00014-77-C-0387)
(AD-A146508; TR-30) Avail: NTIS HC A02/MF A01 CSCL 20/2

Single crystals of MoS(2) and WS(2) were grown by chemical vapor transport both in the presence and absence of cobalt. Hall measurements indicate that cobalt cannot diffuse appreciably into the bulk of MoS(2) or WS(2) and, therefore, can be present only on the surface. Similar results were obtained for as-grown crystals annealed or sulfided in contact with Co(9)S(8) or sulfided after being dipped in a 0.1M CoS0(4)/methanol solution. Author (GRA)

N85-15507# California Univ., San Diego. Dept. of Electrical Engineering and Computer Sciences.
CHARACTERIZATION OF SURFACE ELECTRONIC PROPERTIES OF SEMI-INSULATING InP Final Report, 1 May 1983 - 30 Apr. 1984
H. H. Wieder 26 Sep. 1984 21 p
(Contract N00014-82-K-2032)
(AD-A146553) Avail: NTIS HC A02/MF A01 CSCL 20/12

The surface and interfacial charge carrier transport properties of semiinsulating InP have been investigated. It is shown that space charge limited current flow in the presence of trapping in conjunction with charge transport in the accumulation layer are present in two-terminal and three-terminal InP structures. Additional originator-supplied keywords include: Surface and Interfacial Properties, and 3-5 Compound Semiconductors. GRA

N85-15508# Massachusetts Inst. of Tech., Cambridge.
RESEARCH ON SUBMICROMETER STRUCTURES Final Report, 1 Aug. 1979 - 31 Jul. 1984 on Phase 2
H. I. Smith 31 Jul. 1984 12 p
(Contract N00014-79-C-0908)
(AD-A146578) Avail: NTIS HC A02/MF A01 CSCL 09/1

In phase 1, the objective was to establish a submicrometer structures research lab on the MIT campus, to develop fabrication techniques for the spatial domain below 1000A, and to pursue several areas of interdisciplinary research. Research under phase 1 saw the development of an effective sub-1000A technology, successful alignment of liquid crystal films, progress in our understanding of the graphoepitaxy phenomenon, and attachment of organic molecules to submicrometer structures. In phase 2, we demonstrated surface-energy-driven secondary grain growth in Si and Ge and showed that graphoepitaxial alignment of Ge can be achieved using this grain growth process. These results indicate that if the temperature required for secondary grain growth can be driven down then graphoepitaxy should be able to form the basis of a general process for obtaining single-crystal device films, of virtually any material, on amorphous substrates. This would have significant impact on future military systems. GRA

N85-15509# Max-Planck-Inst. fuer Festkoerperforschung, Stuttgart (West Germany).
THEORETICAL INVESTIGATION OF DEVICE ASPECTS OF SEMICONDUCTOR SUPERLATTICES Final Technical Report, Mar. 1981 - Jun. 1982
G. H. Doehler Sep. 1983 56 p
(Contract DAJA37-81-C-0191)
(AD-A146641; R/D-3092-EE) Avail: NTIS HC A04/MF A01 CSCL 20/2

Semiconductor superlattices are synthetic crystals, which consist either of a periodic sequence of ultrahigh layers of two different semiconductors (compositional superlattices) or of a single homogeneous semiconductor, which is periodically n- and p- doped, investigated electrical and electro-optical device applications of semiconductor superlattices in general, but with special emphasis on fast devices and oscillators for microwave generation. It is found, that an extremely wide spectrum of possibilities results from the fact that the properties of superlattices can be tailored for a given goal. Considered were two groups of device applications according to the two major classes of semiconductor superlattices: (1) Devices, which rely on properties, which are in common to both classes of superlattices. The most appealing devices in this class are the far infrared radiation lasers, based on stimulated emission associated with interlayer transitions. (2) Devices, which relay on the unique features of the doping superlattices. The electronic properties of these superlattices cannot only be tailored but they can be tuned within wide limits for a given specimen. Moreover, the electron-hole recombination lifetimes exceed those of the host materials by many orders of magnitude. GRA

N85-15510# Oak Ridge National Lab., Tenn. Health and Safety Research Div.
ARC-EVAPORATED CARBON FILMS: OPTICAL PROPERTIES AND ELECTRON MEAN FREE PATHS
M. W. Williams, E. T. Arakawa, S. M. Dolfini (Oak Ridge Associated Universities), and J. C. Ashley 1984 14 p refs Presented at the 12th DOE Surface Sci./SUBWOG - 7. SUBWOG - 12B Tech. Exchange Meeting, Oak Ridge, Tenn., 11 Jun. 1984
(Contract DE-AC05-84CR-21400)
(DE85-001246; CONF-840617-7) Avail: NTIS HC A02/MF A01

A method which can be used to calculate inelastic mean free paths for electrons with energies in the range of interest for the interpretation of surface phenomena is briefly described. This method requires a knowledge of the optical properties of the material for the photon energies associated with the oscillator strength of the valence electrons. However, in general it is easier to obtain accurate values of the required properties than it is to measure the electron attenuation lengths in the energy region of interest. This technique, demonstrated here for arc-evaporated carbon, can be used for any material for which the optical properties can be measured over essentially the whole energy range corresponding to the valance electron response. DOE

N85-15511# Sandia Labs., Albuquerque, N. Mex.
STRAINED-LAYER SUPERLATTICE EMITTER AND DETECTOR STRUCTURES USING MODULATION-DOPED ACTIVE REGIONS
L. R. Dawson, T. E. Zipperian, C. E. Barnes, J. J. Wiczer, and G. C. Osbourn 1984 7 p refs Presented at the Intern. Symp. on GaAs and Related Compounds, Biarritz, France, 26 Sep. 1984
(Contract DE-AC04-76DP-00789)
(DE85-000064; SAND-84-1170C; CONF-8409137-1) Avail: NTIS HC A02/MF A01

Double-heterostructure p(+)n diodes were fabricated from strained-layer superlattice (SLS) material in which the emitting and absorbing region consisted of alternate 120 A thick layers of GaAs and In 2Ga 8As. This region was modulation doped by a Si impurity spike in only the central 30 A of the GaAs layers. When operated as detectors (0 volts bias), these structures exhibited internal quantum efficiencies of 75%. As emitters they produced output at 1.02 (MU)m comparable to that of commercially available 1.06 (MU)m devices. Demonstration of efficient emitter/detector operation in modulation-doped SLS materials, in comparison to that of uniformly doped SLS structures and bulk InGaAs commercial devices, while simultaneously optimizing parallel transport properties (horizontal electron mobilities) implies that the InGaAs/GaAs SLS system is an attractive candidate for integrated optoelectronic applications. DOE

N85-15512# Northwestern Univ., Evanston, Ill. Dept. of Chemical Engineering.
SOLID STATE, SURFACE AND CATALYTIC PROPERTIES OF OXIDES Progress Report, Sep. 1983 - Sep. 1984
Harold H. Kung Sep. 1984 19 p refs
(Contract DE-AC02-78ER-04987)
(DE85-002096; DOE/ER-04987/T2) Avail: NTIS HC A02/MF A01

In the past year, efforts were directed to: (1) continue to elucidate the relationship between the surface structure of ZnO and the surface chemistry; (2) attempt to understand the relationship between the bulk structure and the selectivity in the oxidation of butene on iron oxide; and (3) explore the use of electrostatic potential argument to explain the formation of new acid sites in a dilute oxide solution. Progress in these areas is described. DOE

N85-15513# Argonne National Lab., Ill. Materials Science and Technology Div.
SUPERCELL BAND STRUCTURE CALCULATIONS OF THE TWO PEAK PHOTO-AND INVERSE PHOTOEMISSION SPECTRA IN Ce AND Pr COMPOUNDS
M. R. Norman, D. D. Koelling, and A. J. Freeman (Northwestern Univ., Evanston) 1984 7 p refs Presented at the Intern. Conf. on Valence Fluctuations, Koln, West Germany, 27 Aug. 1984
(Contract W-31-109-eng-38)
(DE84-017485; CONF-840876-3) Avail: NTIS HC A02/MF A01

The two peak photoemission and inverse photoemission

spectra in Ce and Pr compounds are determined theoretically using a local density supercell approach with different channels to screen the 4f hole in photoemission and antiscreen the extra 4f electron in inverse photoemission. DOE

N85-15514# Sandia Labs., Albuquerque, N. Mex.
SUBSTRATE PREPARATION FOR THIN FILM DEPOSITION: A SURVEY
D. M. Mattox 1984 15 p refs Presented at the 6th Intern. Conf. on Thin Film, Stockholm, 13 Aug. 1984
(Contract DE-AC04-76DP-00789)
(DE84-016119; SAND-84-1663C; CONF-8408107-1) Avail: NTIS HC A02/MF A01

Surface preparation is an integral part of any thin film deposition process. As the technological demands on films and coatings increase, the need for better and more reproducible surface preparation techniques is also increased. There is a wide variety of approaches to surface preparation and each film-substrate couple and function requires specific development. The problems to be considered and some general approaches to surface preparation technologies are outlined. DOE

N85-15515# Sandia Labs., Albuquerque, N. Mex.
THE GROWTH AND PROPERTIES OF SEMICONDUCTOR STRAINED-LAYER SUPERLATTICES
L. R. Dawson 1984 25 p refs Presented at the Intern. Conf. on Met. Coatings, San Diego, Calif., 9 Apr. 1984
(Contract DE-AC04-76DP-00789)
(DE84-012979; CONF-8404135-4) Avail: NTIS HC A02/MF A01

Strained-layer superlattices provide a wide range of tailorable electronic and optical properties, much of which cannot be achieved in lattice-matched alloys, or cannot be realized in mismatched alloys without the introduction of undesirable numbers of misfit defects. In some cases the strain is used to achieve properties that cannot be achieved in any other manner. MBE was used to prepare GaAs/InO 2GaO 8As SLS material having high structural integrity, and excellent electrical, optical, and transport properties. Such materials were incorporated into various device structures, including field effect transistors, photodetectors, and light emitting diodes with excellent initial results. DOE

N85-15516# Stanford Linear Accelerator Center, Calif.
SURFACE STUDIES OF Nb, ITS COMPOUNDS, AND COATINGS
Edward L. Garwin and Robert E. Kirby Jul. 1984 50 p refs Presented at the 2nd Workshop on RF Superconductivity, Geneva, 23-27 Jul. 1984
(Contract DE-AC03-76SF-00515)
(DE84-017353; SU-SLAC-PUB-3378; CONF-840790-2) Avail: NTIS HC A03/MF A01

A review is given of modern surface physics applied the Nb-vacuum interface and Nb3Sn. DOE

N85-15517# Sandia Labs., Albuquerque, N. Mex.
EVIDENCE FOR PAIRING OF IMPLANTED NITROGEN IN SILICON
H. J. Stein 1984 8 p refs Presented at Defects in Semiconductors Conf., Coronado, Calif., 13 Aug. 1984
(Contract DE-AC04-76DP-00789)
(DE84-015622; SAND-84-1640C; CONF-840878-1) Avail: NTIS HC A02/MF A01

Local modes produced by implanted nitrogen isotopes (N-14, N-15) and combination of isotopes in Si were investigated by infrared absorption. Frequencies for two prominent absorption bands in N-14 implanted Si are the same as those reported for Si doped with N in the melt, and isotopic substitution confirms assignment of the bands to Si-N vibrations. Absorption bands appear at intermediate frequencies when N-14 and N-15 are combined by sequential implantations. By analogy to B-B pairs and B isotope effects in Si, the two major absorption bands in N-implanted Si are attributed to vibrations along and transverse to distorted substitutional N-N pair axes. DOE

N85-15518# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANOMALOUS ELECTRONIC TRANSPORT IN BORON CARBIDES
D. Emin (Sandia National Labs.), G. A. Samara (Sandia National Labs.), and C. Wood 1984 5 p refs Presented at the 17th Intern. Conf. on the Phys. of Semiconductors, San Francisco, 6 Aug. 1984
(Contract DE-AC04-76DP-00789)
(DE84-015620; SAND-84-1449C; CONF-840879-1) Avail: NTIS HC A02/MF A01

The boron carbides are composed of icosahedral units, B12 and B11C1, linked together by strong intericosahedral bonds. With such distributions of icosahedral and intericosahedral compositions, boron carbides, B/sub 1-x/C/sub x/, are single phase over 0.1 less than or equal to x less than or equal to 0.2. The electronic transport properties of the boron carbides were examined within this single-phase region. Results are inconsistent with conventional analyses of both itinerant and hopping transport. Most striking are Seebeck coefficients which are both large and rapidly increasing functions of temperature despite thermally activated dc conductivities. These results manifest the hopping of small bipolaronic holes between carbon-containing icosahedral that are inequivalent in energy and electron-lattice coupling strength. Under hydrostatic pressures up to approx. 25 kbar, the dc conductivities increase with pressure. This anomalous behavior for hopping conduction reflects the distinctive structure and bonding of these materials. DOE

N85-15519# Argonne National Lab., Ill.
GRAIN BOUNDARY STRUCTURE IN NIO
Karl L. Merkle, J. F. Reddy, and C. L. Wiley Aug. 1984 7 p refs Presented at the Intern. Conf. on the Struct. and Properties of Internal Interfaces, Irsee, West Germany, 19-23 Aug. 1984
(Contract W-31-109-eng-38)
(DE84-016242; CONF-840884-2) Avail: NTIS HC A02/MF A01

The structure of grain boundaries (GBs) in NiO was studied by transmission electron microscopy. It is found that tilt GBs in NiO are generally faceted. Structural periodicities within facets were observed at low and high misorientation. An effective reduced atomic density at the GB within a region of 0.5 to 0.8 nm in width is suggested by the defocus contrast behavior of high angle tilt and twist GBs. DOE

N85-15520# Hanford Engineering Development Lab., Richland, Wash.
IRRADIATION CREEP INDUCED ANISOTROPY IN a/2<110> DISLOCATION POPULATIONS
D. S. Gelles May 1984 20 p refs Presented at the 12th Intern. Symp. on Effects of Radiation on Mater., Williamsburg, Va., 18-20 Jun. 1984
(Contract DE-AC06-76FF-02170)
(DE84-016623; HEDL-SA-3033-FP; CONF-840604-22) Avail: NTIS HC A02/MF A01

The contribution of anisotropy in Burgers vector distribution to irradiation creep behavior has been largely ignored in irradiation creep models. However, findings on Frank loops suggest that it may be very important. Procedures are defined to identify the orientations of a 2<110> Burgers vectors for dislocations in face-centered cubic crystals. By means of these procedures the anistropy in Burgers vector populations was determined for three Nimonic PE16 pressurized tube specimens irradiated under stress. Considerable anisotropy in Burgers vector population develops during irradiation creep. It is inferred that dislocation motion during irradiaton creep is restricted primarily to a climb of a/2<110> dislocations on 100 planes. Effect of these results on irradiation creep modeling and deformation induced irradiation growth is considered. DOE

N85-15521# Department of Energy, Washington, D. C. Office of Fusion Energy.
ASC 1984 APPLIED SUPERCONDUCTIVITY CONFERENCE
1984 67 p Conf. held in San Diego, Calif., 9-13 Sep. 1984

(DE84-016204; CONF-840937) Avail: NTIS HC A04/MF A01

Abstracts are given of presentations covering: superconducting device fabrication; applications of RF superconductivity; conductor stability and losses; detectors and signal processing; fusion magnets; A15 and Nb-Ti conductors; stability, losses, and various conductors; SQUID applications; new applications of superconductivity; advanced conductor materials; high energy physics applications of superconductivity; electronic materials and characterization; general superconducting electronics; ac machinery and new applications; digital devices; fusion and other large scale applications; in-situ and powder process conductors; ac applications; synthesis, properties, and characterization of conductors; and superconducting microelectronics. DOE

N85-15522# University of Southern California, Marina del Rey. Inst. for Physics and Imaging Science.

MOBILITY AND TRAPPING TIME MEASUREMENTS IN HgI2

J. H. Kusmiss, J. S. Iwanczyk, J. B. Barton, A. J. Dabrowski, and W. Seibt (Uppsala Univ.) 1983 7 p refs Presented at Jordan Intern. Elec. and Electron. Engr. Conf., Amman, Jordan, 25 Apr. 1983

(Contract DE-AM03-76SF-00113)

(DE84-015954; CONF-8304195-1) Avail: NTIS HC A02/MF A01

The charge transport parameters of a solid-state radiation detector are of paramount importance in determining its spectrometric performance. Various methods of determining mobilities and trapping times for electrons and holes in mercuric iodide (HgI2) are reviewed, including mobility-trapping time products via the Hecht relation, mobility measurements by voltage pulse risetime determination, and mobility and trapping time by current pulse shape analysis. Experimental results for HgI2 detectors are presented for the different types of measurements described. Among the experimental results presented are three noteworthy items: (1) trapping times for electrons and holes in a variety of different crystals and detectors were obtained from a combination of (MU)tau and (MU) measurements, (2) a new two-source type of experimental setup was developed which gives both the electron and hole pulse spectra simultaneously, and (3) for a one-centimeter thick HgI2 detector studied by means of current pulse shape analysis a value of at least 0.03 cm(2)/V was found for the product of electron mobility and trapping time. DOE

N85-15523# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

CHARACTERIZATION OF BICRYSTAL GRAIN BOUNDARY PROPERTIES USING DEVICE STRUCTURES

S. Hogan, T. Scuyler, and T. F. Ciszek May 1984 7 p refs Presented at the 17th IEEE Photovoltaic Spec. Conf., Orlando, Fla., 1-5 May 1984

(Contract DE-AC02-83CH-10093)

(DE84-004509; SERI/TP-212-2278; CONF-840561-22) Avail: NTIS HC A02/MF A01

Small (2 mm x 2 mm) photovoltaic devices were used to determine the electrical characteristics of selective grain boundaries. The ESP bicrystal sheet growth method allows crystal orientation to be determined prior to growth and as such is an excellent tool for selective examination. Photolithographic techniques of a special pattern and mesa etching were used to isolate areas on and around the grain boundaries for device characterization. Spreading resistance measurements over and next to the grain boundaries, as well as characterization, were used to study electrical effects of these grain boundaries. DOE

N85-14971# Joint Publications Research Service, Arlington, Va.

MEASUREMENT OF PARAMETERS DEFINING ORIENTATION OF LIQUID CRYSTALS IN ELECTROOPTIC CELLS Abstract Only

V. A. Korzhenevskiy, V. I. Lebedev, S. A. Levichev, and M. G. Timilin *In its* USSR Rept.: Eng. and Equipment (JPRS-UEQ-84-007) 14 Nov. 1984 p 32 Transl. into ENGLISH from Optiko-Mekhan. Prom. (Leningrad), no. 2, Feb. 1984 p 19-21 (For primary document see N85-14954 06-31)

Avail: NTIS HC A04/MF A01

N85-15023# Joint Publications Research Service, Arlington, Va.

ACOUSTOELECTRIC INTERACTION IN DOUBLE-LAYER SEMICONDUCTORS Abstract Only

V. Kunigelis *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 32-33 Transl. into ENGLISH from Litovskiy Fiz. Sb. (Vilnius, USSR), v. 23, no. 6, Jun. 1983 p 57-62 (For primary document see N85-14991 06-31)

Avail: NTIS HC A04

N85-15078# Joint Publications Research Service, Arlington, Va.

DEVELOPMENT OF TECHNOLOGY OF SILICON SINGLE-CRYSTAL PRODUCTION SEMICONDUCTOR POWER DEVICES: STATE OF ART OUTLOOK Abstract Only

I. N. Voronov and P. M. Grinshteyn *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-011) 25 Sep. 1984 p 59 Transl. into ENGLISH from Elektrotek. (Moscow), no. 3, Mar. 1984 p 30-34 (For primary document see N85-15042 06-31)

Avail: NTIS HC A07/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N85-15524# National Aerospace Lab., Tokyo (Japan).

THERMODYNAMICAL CHARACTERISTICS OF HEAT STORAGE REACTORS USING METAL HYDRIDES

Hiroshi Endo, Tadashi Ito, and Shinjiro Wakao Jul. 1984 24 p refs In JAPANESE; ENGLISH summary

(NAL-TR-822; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Theoretical and experimental investigations of a metal hydride heat storage system are presented. Two types of model reactors, one with quasi-two-dimensional and the other with axisymmetric filling of metal hydride, were constructed. The reaction and heat transfer processes were constructed. The reaction and heat transfer processes were analyzed both theoretically and experimentally, and based on the results, the characteristic quantities which influence the performance of reactors were formulated. Then, design criteria for good performance were put forth in terms of these quantities. Author

N85-15525# Ballistic Research Labs., Aberdeen Proving Ground, Md.

INTERCOMPARISON BETWEEN WEST GERMANY AND US THERMODYNAMIC CODES Final Report

E. Freedman Aug. 1984 29 p Presented at DEA-1060 meeting at Dahlgren, VA in 1978

(AD-A146622; AD-F300483; ARBRL-MR-03373) Avail: NTIS HC A03/MF A01 CSCL 20/13

A round robin (ringversuch) has been conducted among various FRG thermodynamic codes, between two US codes, and between one FRG and one US code. The agreement within each country is excellent. Comparison between the two countries is hampered by the correction for non-ideal gas behavior in the only available West German results. It is probable that they would show good agreement in the limit of ideal gas behavior. The US BLAKE code gives slightly smaller co-volumes than does the West German code; the larger values are probably the better ones. The definition of heat capacity by hot reacting gases is not the same in all codes and requires some attention by ballisticians. GRA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N85-15526# Little (Arthur D.), Inc., Cambridge, Mass.
SURVEY RELATING TO THE IMPLEMENTATION OF COST/SCHEDULE CONTROL SYSTEMS CRITERIA WITHIN THE DEPARTMENT OF DEFENSE AND INDUSTRY
15 Aug. 1984 65 p
(Contract MDA903-82-C-0561)
(AD-A146664) Avail: NTIS HC A04/MF A01 CSCL 05/1

Since 1967, the DOD has required its contractors to have cost and schedule performance measurement systems that satisfy certain criteria. These criteria are considered necessary to monitor and control contract performance. Specifically, the objectives of the criteria are for contractors to have cost and schedule control systems which accomplish both of the following: are effective for contractors in meeting their requirements for controlling contract performance; and provide data which give an adequate basis for responsible decision-making by both contractor management and DOD components. The criteria, known as the Cost/Schedule Control Systems Criteria (C/SCSC), are applicable to selected contracts within programs designated as major system acquisitions. Over the years since 1967, controversies surrounding C/SCSC and associated reporting requirements have existed within industry and government. These controversies or issues can be categorized under two headings: (1) whether the costs of the criteria and associated reporting requirements outweigh their benefits, and (2) concerns about the specifics of how these requirements have been implemented. GRA

N85-15527# Titan Systems, Inc., McLean, Va.
TOWARD AN IMPROVED FIPS COST-BENEFIT METHODOLOGY. PHASE 2: DESCRIPTIVE MODELS, GENERAL PURPOSE APPLICATION SOFTWARE DEVELOPMENT AND MAINTENANCE Final Report
Mary Lou Chipman, Marco Fiorello, Monty Snead (Aurora Associates, Inc., Washington, D.C.), Peg Kay (NBS, Gaithersburg, Md.), and Patricia Powell (NBS, Gaithersburg, Md.) Jun. 1984 60 p refs
(PB84-226943; NBS/SP-500-116; LC-84-601071) Avail: NTIS HC A04/MF A01; Also avail. from SOD as SN003-003-03591-7 CSCL 05A

A functional-flow descriptive model that can be used to categorize the application software (ASOF) development and maintenance activities of Federal data processing facilities. ASOF-related activities may be conceptually represented in descriptive model form by combining one or more of the basic model tasks. The comprehensive framework for ASOF development and maintenance provided by the descriptive model can be used in the identification of impacts from standards and guidelines and in the preparation of cost-benefit impact assessments. The framework provides both macro and micro levels of detail in order to link the descriptive models to additional data processing issues. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N85-15528*# National Aeronautics and Space Administration, Washington, D. C.
STUTTGART INTERCONNECTION NETWORK PROJECT FROM PIX TO NICS
Dec. 1984 24 p refs Transl. into ENGLISH of "Das Projekt Network Inter-Connection Stuttgart, (NICS), von PIX zu NICS" rept. 9/81 Benutzer (RUS) Informationen, Stuttgart, Sep. 1981 p 1-15 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77802; NAS 1.15:77802; Rept-9/81) Avail: NTIS HC A02/MF A01 CSCL 05B

The PIX follow-up project NICS is described. The purpose of PIX was access to X.25, the DATEX-P network of the Federal German Post Office. The development and implementation of higher protocols for levels 4-7 in the ISOSINN was the actual problem here. Results of the PIX project are given. NICS (Stuttgart Interconnection Network Project) is presented. International Protocols are reviewed. PAD service is described, which allows terminal access to DATEX-P network of the Federal German Post Office. Author

N85-15529# Naval Postgraduate School, Monterey, Calif.
SETTING TIME STANDARDS AT NISTARS (NAVAL INTEGRATED STORAGE AND RETRIEVAL SYSTEM) M.S. Thesis
R. L. Miller Mar. 1984 93 p
(AD-A146371) Avail: NTIS HC A05/MF A01 CSCL 14/2

The Naval Integrated Storage and Retrieval System (NISTARS) is currently in the process of being installed at four Naval Supply Centers in the United States. These systems will automatically track, record, and direct movement of material from the receiving dock through storage to the final point of issue. Despite technological advances, accurate standards of anticipated materiel throughput for developing labor requirements have not yet been set of NISTARS. Therefore, this thesis investigates the applicability of setting time standards at NISTARS activities. Various methods of determining standard times are reviewed. Governmental sources of standard times information are examined. The steps for developing standard times are provided. An example standard time for the rackables manned storage and retrieval machine is presented. It is concluded that standard times can and should be implemented at NISTARS to facilitate more accurate labor scheduling and to increase warehousing productivity.
Author (GRA)

N85-15530# Stanford Univ., Calif.
RESEARCH ON INTROSPECTIVE SYSTEMS Quarterly Progress Report, 1 Jan. - 30 Jun. 1984
M. R. Genesereth 31 Aug. 1984 8 p
(Contract N00014-81-K-0004)
(AD-A146406) Avail: NTIS HC A02/MF A01 CSCL 05/2

A longer term project involves the creation of facilities for the compilation of MRS programs. Work on this has begun, and proto-compilers have been written to handle the process of drawing inference by either backward or forward chaining. More theoretical research is under way to investigate the possibility of automatically determining at compile time which of these two methods is the most effective for a specific application. Issues of runtime control have also been studied. Attention in this area has been focused primarily on the problem of recursive inference; reasonably effective methods have been developed and implemented for dealing with this. General research has also been undertaken with regard to the presentation of the results of an AI program, be it MRS in particular or a more general problem. Standards have been developed whereby the power and expressiveness of competing

presentation languages may be evaluated. Other theoretical work completed during the past six months has been an investigation of the connections between McCarthy's circumscription and the other paradigms for non-monotonic reasoning, and the development of strategies and protocols for distributing deduction between several large processors. With an eye toward an eventual development of a learning facility within MRS, a version space algorithm has been implemented, and research begun on the automatic generation of experiments by machine. GRA

N85-15531# Army Tropic Test Center APO, Miami 34004.
METHODOLOGY INVESTIGATION. STREAMLINED TEST REPORTING AND PLANNING (STRAP): DATA FLOW PROCEDURES Final Report, 16 Jan. - 16 Apr. 1984
J. C. Bryan Sep. 1984 19 p
(AD-A146463; USATTC-840910) Avail: NTIS HC A02/MF A01 CSCL 09/2

From 16 January through 16 April 1984, the US Army Tropic Test Center conducted an investigation to develop a computerized system for tracking the flow of data from the field to the Data Analysis Laboratory during active testing. Data flow events were defined and interfaced successfully with the appropriate computerized Test Status Information Program test planning and reporting events. A computerized calendar from the Statistical Analysis System Institute was used to develop a data flow plan which schedules data hand-off events from the field to the Data Analysis Laboratory to ensure sufficient lead time for timely data reduction and analysis. This lead time permits data validation during the test execution phase and provides reduced data to subtest authors for timely completion of final test reports. Author (GRA)

N85-15532# Naval Postgraduate School, Monterey, Calif.
AN UPDATE OF THE FUNCTIONAL REQUIREMENTS OF THE NAVAL AVIATION LOGISTICS COMMAND MANAGEMENT INFORMATION SYSTEM (NALCOMIS) M.S. Thesis
J. W. Puffer Mar. 1984 85 p
(AD-A146565; AD-E440255) Avail: NTIS HC A05/MF A01 CSCL 15/5

Efforts to improve Naval Aviation readiness have taken the form of automated aviation maintenance management information systems. The Naval Aviation Logistics Command Management Information System (NALCOMIS) is a large complex system that has been in development since the mid 1970s. An interim system of a smaller scale, Status Inventory Data Management System (SIDMS), has been operational on Atlantic Fleet aircraft carriers for over two years. This thesis updates the functional requirements of NALCOMIS based on inputs from operational users of the interim system SIDMS. Data from questionnaires and structured personal interviews provide conclusions as to which functional requirements are most important/useful and which are least important/useful from a user point of view. The conclusions provide guidance for NALCOMIS implementation. Author (GRA)

N85-15533# Executive Office of the President, Washington, D.C.
PUBLICATIONS OF THE EXECUTIVE OFFICE OF THE PRESIDENT: JANUARY 20, 1981 - JUNE 30, 1984
1984 7 p
(PB84-230671) Avail: NTIS HC A02/MF A01 CSCL 05B

Over 140 documents issued by the components of the Executive Office of the President, and available for sale to the public are listed. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N85-15534# Naval Surface Weapons Center, White Oak, Md.
NAVAL SURFACE WEAPONS CENTER TECHNOLOGY TRANSFER REPORT (FY83) Annual Report
R. D. Johnson 30 Sep. 1983 33 p
(AD-A146501; NSWC/MP-84-38) Avail: NTIS HC A03/MF A01 CSCL 15/3

This report describes the Naval Surface Weapons Center Technology Transfer program and presents narrative summaries of related projects performed during FY83. Technology Application Assessment forms and a listing of patents/navy cases for this time period are also presented. The objectives of navy technology transfer are (1) to disseminate information on non-critical technology, originally developed in support of military applications, for potentially alternative uses in the public and private sectors; and (2) to promote joint cooperative development programs that address problems mutual concern to the Navy transfers technical expertise to other Federal Government agencies; state and local governments; small and large businesses; nonprofit organizations; and such public service organizations as schools, hospitals, and foundations. GRA

N85-15535# City of Lynwood, Calif.
ELECTRIC AND HYBRID VEHICLE DEMONSTRATION PROJECT Final Project Report
1984 2 p
(Contract DE-FC08-80NV-10116)
(DE84-014622; DOE/NV-10116/1) Avail: NTIS HC A02/MF A01

Difficulties involved in the electric vehicle demonstration of the City of Lynwood, California are detailed. The project was stated to a limited success. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N85-15536*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE IRAS GALAXY 0421+040P06: AN ACTIVE SPIRAL (?) GALAXY WITH EXTENDED RADIO LOBES
C. A. Beichman, C. G. Wynn-Williams (Hawaii Univ.), C. J. Lonsdale,

S. E. Persson (Mount Wilson Observatory), J. N. Heasley (Hawaii Univ.), G. K. Miley (Sterrewacht Leiden), B. T. Soifer (Palomar Observatory), G. Neugebauer (Palomar Observatory), E. E. Becklin (Hawaii Univ.), and J. R. Houck (Cornell Univ.) 2 Aug. 1984 30 p refs Sponsored by NASA
(NASA-CR-174208; NAS 1.26:174208) Avail: NTIS HC A03/MF A01 CSCL 03A

The infrared bright galaxy 0421+040P06 detected by IRAS at 25 and 60 microns was studied at optical, infrared, and radio wavelength. It is a luminous galaxy with apparent spiral structure emitting 4 x 10 to the 37th power from far-infrared to optical wavelengths. Optical spectroscopy reveals a Seyfert 2 emission line spectrum, making 0421+040P06 the first active galaxy selected from an unbiased infrared survey of galaxies. The fact that this galaxy shows a flatter energy distribution with more 25 micron emission than other galaxies in the infrared sample may be related to the presence of an intense active nucleus. The radio observations reveal the presence of a non-thermal source that, at 6 cm, shows a prominent double lobed structure 20 to 30 kpc in size extending beyond the optical confines of the galaxy. The radio source is three to ten times larger than structures previously seen in spiral galaxies. R.S.F.

N85-15537*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
UNIDENTIFIED IRAS SOURCES: ULTRAHIGH LUMINOSITY GALAXIES
J. R. Houck, D. P. Schneider, G. E. Danielson, C. A. Beichman, Carol J. Lonsdale, G. Neugebauer, and B. T. Soifer [1985] 18 p refs Prepared in cooperation with Palomar Observatory, Pasadena, Calif. and Cornell Univ., Ithaca, N.Y.
(Contract NAS5-25451; Grants NSF AST-83-12699; NSF AST-83-14134)
(NASA-CR-174207; NAS 1.26:174207) Avail: NTIS HC A02/MF A01 CSCL 03A

Optical imaging and spectroscopy measurements were obtained for six of the high galactic latitude infrared sources reported by Houck, et al. (1984) from the IRAS survey to have no obvious optical counterparts on the POSS prints. All are identified with visually faint galaxies that have total luminosities in the range 5 x 10 to the 11th power stellar luminosity to 5 x 10 to the 12th power stellar luminosity. This luminosity emerges virtually entirely in the infrared. The origin of the luminosity, which is one to two orders of magnitude greater than that of normal galaxies, is not known at this time. Author

N85-15538# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
CONSTRUCTION OF A SUPERHETERODYNE RECEIVER FOR 10 MICRON WAVES TO BE PUT ON A CASSEGRAIN OPTICS TELESCOPE FOR SPECTROSCOPIC RESEARCH ON THE MARS AND VENUS ATMOSPHERES [BAU EINES HETERODYNEMPFAENGERS FUER 10 MICRON WELLENLAEGE ZUM EINSATZ AM CASSEGRAINFOKUS ASTRONOMISCHER TELESKOPE UND SPEKTROSKOPISCHE UNTERSUCHUNG DER MARS- UND VENUSATMOSPHAERE]
Hans Ulrich Kaeufl Jul. 1984 121 p refs In GERMAN
(MPE-183; ISSN-0340-8922) Avail: NTIS HC A06/MF A01

A superheterodyne spectrometer of medium infrared range was developed for a Cassegrain optics astronomical telescope. This device provides resolution similar to a laser spectrometer. The local oscillator is a carbon dioxide laser. The intermediate frequency range is 2 GHZ. The spectral resolution is 500,000 to 5 million. The instrument reaches the maximum theoretical sensitivity of a superheterodyne receiver. Absorption and emission of gaseous carbon dioxide in the atmosphere of Mars and Venus is measured by the system and atmospheric models are constructed. Other planets, stellar sources, and interstellar gas are also examined. Author (ESA)

N85-14992# Joint Publications Research Service, Arlington, Va.
APERTURE SYNTHESIS FOR RADIOASTRONOMY Abstract Only
Yu. N. Pariyskiy *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1319-1322 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-14997# Joint Publications Research Service, Arlington, Va.
MODERN RADIOASTRONOMICAL APERTURE SYNTHESIS SYSTEMS (REVIEW) Abstract Only
N. M. Tseytlin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1380-1393 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15001# Joint Publications Research Service, Arlington, Va.
APPARATUS OF SHORT BASELINE CENTRIMETRIC WAVE RADIOINTERFEROMETER WITH CABLE COMMUNICATION LINES FOR ASTROPHYSICAL RESEARCH Abstract Only
V. A. Alekseyev, A. Ye. Kryukov, B. N. Lipatov, and A. S. Sizov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1428-1436 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15003# Joint Publications Research Service, Arlington, Va.
APPROXIMATING TRUE RADIOLUMINANCE DISTRIBUTION FROM OBSERVATIONS ON APERTURE SYNTHESIS SYSTEMS Abstract Only
M. V. Konyukov *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 8-9 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1448-1456 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15004# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF RADIO IMAGE ON RATAN-600 RADIOTELESCOPE Abstract Only
B. S. Minchenko *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 9-10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1463-1471 Original language doc. previously announced in IAA as A84-20815 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

N85-15005# Joint Publications Research Service, Arlington, Va.
ATTEMPTS TO CONTRUCT TWO-DIMENSIONAL IMAGE OF SUN FROM OBSERVATIONS MADE WITH RATAN-600 RADIOTELESCOPE BY RELAY RACE METHOD Abstract Only
O. A. Golubchina and G. S. Golubchin *In its* USSR Rept.: Electron. and Elec. Eng. (JPRS-UEE-84-012) 26 Sep. 1984 p 10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorkiy, USSR), v. 26, no. 11, Nov. 1983 p 1472-1479 Original language doc. previously announced in IAA as A84-20816 (For primary document see N85-14991 06-31)
Avail: NTIS HC A04

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N85-15539*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOCAL INTERSTELLAR MEDIUM. INTERNATION ASTRONOMICAL UNION COLLOQUIUM NO. 81
Yoji Kondo, ed., Frederick C. Bruhweiler, ed. (Catholic Univ. of

America, Washington, D.C.), and Blair D. Savage, ed. (Wisconsin Univ., Madison) Washington Nov. 1984 356 p refs Colloq. held in Madison, Wisc., 4-6 Jun. 1984
(NASA-CP-2345; NAS 1.55:2345) Avail: NTIS HC A16/MF A01 CSCL 03C

Helium and hydrogen backscattering; ultraviolet and EUV absorption spectra; optical extinction and polarization; hot gases; soft X-ray observations; infrared and millimeter wavelengths; radio wavelengths and theoretical models of the interstellar matter within about 150 parsecs of the Sun were examined. For individual titles, see N85-15540 through N85-15595.

N85-15540*# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Service d'Aeronomie.
HELIUM AND HYDROGEN OF THE LOCAL INTERSTELLAR MDIUM OBSERVED IN THE VICINITY OF THE SUN
Jean-Loup Bertaux *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 3-23 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The Sun illuminates the hydrogen and helium atoms of the interstellar medium through which it travels. As a result, the Sun and the whole solar system are imbedded in a glow of the resonance lines of hydrogen (H Lyman alpha; 121.6nm) and helium (58.4nm). From the intensity distribution of the glow in the solar system, the density of H and He in the local interstellar medium (LISM) and the direction of the relative motion between the Sun and the LISM in the vicinity of the Sun are derived. The velocity module and the LISM temperature are more adequately found from a measurement of the Lyman alpha line shape, which is an image of the velocity distribution of H atoms. The result is summarized and together the methods of interpretation and difficulties are dicusssed. B.G.

N85-15541*# University of Southern California, Los Angeles. Center for Space Sciences.
PIONEER 10 AND VOYAGER OBSERVATIONS OF THE INTERSTELLAR MEDIUM IN SCATTERED EMISSION OF THE He 584 A AND H LYA 1216 A LINES
D. E. Shemansky, D. L. Judge, and J. M. Jessen *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 24-27 refs Previously announced as N84-34361 (For primary document see N85-15539 06-90)
(Grants NAGw-163; NAGw-106)
Avail: NTIS HC A16/MF A01 CSCL 03C

The combination of Pioneer photometric and Voyager spectrometric observations of EUV interstellar-interplanetaryemissions in the region beyond 5 A was applied to a determination of atomic hydrogen and helium densities. These density estimates obtained from direct measurement of scattered radiation depend on absolute calibration of the instruments in the same way as other earlier determinations based on the same method. However, the spacecraft data were combined with daily II sun averages of the H Lyman 1216 A line obtained by the Solar Mesospheric Explorer satellite to obtain a measure of atomic hydrogen density independent of instrument absolute calibration. The method depends on observations of long and short term temporal variability of the solar line over a one year period, and the fact that the ISM is optically thick. The density estimates from preliminary work on these observations are H = 0.12/cu cm and H = .016/cu cm, giving a density ratio close to the cosmic abundance value in contrast to some earlier results indicating a depletion of atomic hydrogen. Estimates were obtained of galactic background emissions in the signals of both spacecraft. Author

N85-15542*# Bonn Univ. (West Germany). Inst. fuer Astrophysik.
CHANGES OF LISM CHARACTERISTICS IN THE HELIOSPHERIC INTERFACE
Hartmut W. Ripken and Hans J. Fahr *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 29-31 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The LISM properties can be deduced from observations of interstellar neutral gases in the inner solar system. Parameters accessible by this method are the interstellar wind vector and the densities and temperatures of hydrogen and helium, implying also the deduction of the relative abundance ratios and the degree of ionization in the LISM. Direct inference from observations, for example resonance luminescence measurements of Ly-alpha and He-58.4 nm radiation, yields values appropriate only for the inner solar system, i.e. for the regions within the heliopause dominated by the solar wind plasma. Particularly the subsonic LISM plasma interface ahead of the heliopause causes profound changes in the properties of the neutral LISM gas traversing this region. Mainly p-H charge exchange processes ive rise to the destruction of primary hydrogen and the production of secondary hydrogen atoms, the net effect being a depletion of the neutral hydrogen component of the LISM by about 50%. Details on the depletion mechanisms, the hydrogen and oxygen extinctions, and the consequences for the Ly-alpha resonance luminescence intensity interpretations are presented. Author

N85-15543*# Bonn Univ. (West Germany). Inst. fuer Astrophysik.
BROADENING OF THE INTERPLANETARY HELIUM CONE STRUCTURE DUE TO ELASTIC COLLISIONS OF LISM HELIUM ATOMS WITH SOLAR WIND IONS
Hans J. Fahr, Hans U. Nass, and Daniel Rucinski (Polish Academy of Sciences, Warsaw) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 32-37 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Neutral interstellar particles penetrating into the heliosphere, besides being subject there to specific loss processes, suffer elastic collisions with KeV-solar wind ions. The momentum transfer to the neutrals connected with these collisions leads to a loss of angular momentum with respect to the Sun and to a fractional compensation of the effective solar gravity. The dynamical particle trajectories hence are changed into non-Keplerians leading to density and temperature distributions differing from those calculated in the past. This is found from a solution of the Boltzmann equation that linearizes the effect of this additional force. It is shown that the HeI-584A resonance glow of the heliospheric helium cone lead to substantially lower interstellar helium temperatures if re-interpreted on the basis of this revised theory. These temperatures now seem to be in accordance with the derived temperatures for interstellar hydrogen. Author

N85-15544*# Catholic Univ. of America, Washington, D.C. Dept. of Physics.
ABSORPTION LINE STUDIES AND THE DISTRIBUTION OF NEUTRAL GAS IN THE LOCAL INTERSTELLAR MEDIUM
Frederick C. Bruhweiler *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 39-50 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Previous published absorption line studies performed at ultraviolet and visual wavelengths are combined with new ultraviolet data in order to map out the distribution of HI within 150 pc of the Sun. Newly presented data for distances less than 50 pc further support the local cloud model as presented by Bruhweiler (1982). The Sun is embedded, near the edge of a diffuse cloud with total column density 2 x 10 to the 19th power/sq cm. Most observed directions within 50 pc away from the cloud body reveal trace amounts of gas (N)HI) approximately 10 to the 18th power/sq cm presumably arising in the outer skin of the local cloud. At greater distances (50 approximately or <d approximately or < 150 pc) most directions show significant absorption with N(HI)> 10(19)/sq cm. Two directions, one toward the northern galactic pole (NGP), the other toward beta CMa exhibit unusually low HI column densities out to distances of 150 to 200 pc. However, substantial amounts of gas N(HI) > 10 to the 19th power/sq cm, are seen toward the NGP at greater distances. The implicatons of these results on astronomy at wavelengths shortward of 912A are discussed. Author

N85-15545*# Chicago Univ., Ill. Dept. of Astronomy and Astrophysics.
SYNTHESIS OF DATA ON THE LOCAL INTERSTELLAR MEDIUM
Donald G. York and Priscilla C. Frisch *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 51-59 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

While no completely definitie picture of the local interstellar medium can be presented yet, some general conclusions can be drawn. New UV results are collated with published results to help state the physical properties of the gas. A morphological view of the local medium is given. B.G.

N85-15546*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF INTERSTELLAR HI TOWARD NEARBY LATE-TYPE STARS
Wayne B. Landsman, Richard C. Henry (Johns Hopkins Univ.), H. Warren Moos (Johns Hopkins Univ.), and Jeffrey L. Linsky (Joint Inst. for Lab. Astrophysics.) *In its* Local Interstellar Medium, No. 81 Nov. 1984 p 61-63 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

High-disperson Copernicus and IUE observations of chromospheric Ly alpha emission are used to study the distribution of HI in the local interstellar medium. Interstellar parameters are derived toward 3 stars within 5 pc of the Sun, and upper limits are given for the Ly alpha flux from 9 other stars within 10 pc. Author

N85-15547*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF LOCAL INTERSTELLAR Mg I AND Mg II
Frederick C. Bruhweiler (Catholic Univ. of America), W. Oegerle (Space Telescope Science Inst.), E. Weiler (NASA, Washington, D.C.), R. Stencel (NASA, Washington, D.C.), and Y. Kondo *In its* Local Interstellar Medium, No. 81 Nov. 1984 p 64-66 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Copernicus and IUE observations of 5 stars within 50 pc of the Sun were combined to study the ionization of magnesium in the local interstellar medium (LISM). The high resolution Copernicus spectrometer was used to detect interstellar MG I 2852 in the spectra of alpha Gru, alpha Eri, and alpha Lyr, while placing upper limits on Mg I in the spectra of alpha CMa and alpha PsA. Observations of Mg II 2795, 2802 for these stars were also obtained with IUE and Copernicus. The column densities of Mg I and Mg II are used to place constraints on the temperature of the LISM. Author

N85-15548*# Queen Mary Coll., London (England).
Mg II SPECTRA OF LATE TYPE STARS USED TO PROBE THE LISM
J. E. Beckman, L. Crivellari (Osservatorio Astronomico, Trieste, Italy), M. L. Franco (Inst. de Astronomia y Fisica de Espacio), P. Molaro (Osservatorio Astronomico, Trieste, Italy), and G. Vladilo (Osservatorio Astronomico, Trieste, Italy) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 67-70 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

IUE spectra of Mg II h and k in late type dwarfs and giants were used to detect and measure absorption components due to the LISM. This technique gives a method of probing the awkward range from d = 3 pc to d = 80 pc from the Sun. In spite of interpretational uncertainties the HI component of the LISM can be plotted well enough to confirm it as a cloud some 20 to 30 pc in extent, peaking sharply in density towards l(II)-25 deg., moving towards the Sun from l(II)-25 deg, b(II) = + 10 deg., at 28 Km/sec. The hole towards l(II) = 150 deg is confirmed, suggesting a solar position close to the cloud's edge in this direction. Author

N85-15549*# Tuebingen Univ. (West Germany). Astronomical Inst.
FeII AND MgII IN THE NEARBY INTERSTELLAR MEDIUM
Klaas S. deBoer and Heinz Lenhart *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 71-74 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Ultraviolet spectra with 15 km/s resolution of bright stars were searched for FeII and MgII interstellar lines. Equivalent widths of absorption for 8 stars are presented and average line-of-sight densities n(FeII) = 4 x 10(-8) and n(MgII) = 2 x 10(-7)/cubic cm are calculated. This represents approximately n(H) = 0.03/cuib cm. Author

N85-15550*# Observatoire de Strasbourg (France).
A TYPE STARS AS PROBES OF THE LOCAL INTERSTELLAR MEDIUM
R. Freire Ferrero, R. Ferlet (Inst. d'Astrophysique, Paris), and A. Vidal-Madjar (Inst. d'Astrophysique, Paris) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 75-80 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

With the aim to sample the Local Interstellar Medium (LISM), it was proposed to use A stars as targets. The Mg II UV lines seem to be the best interstellar absorption candidates. Several hundreths of A stars can be reached within 100 pc. First preliminary results (20 lines of sight) are presented, based on previous Copernicus and actual IUE observations. R.J.F.

N85-15551*# European Space Agency. ESA Tracking Station, Madrid (Spain).
PROBE OF THE NEARBY INTERSTELLAR MEDIUM BY THE VACANT LINE OF SIGHT TO BETA CMa
C. Gry, Donald G. York (Chicago Univ., Ill.), and A. Vidal-Madjar (Inst. d'Astrophysique, Paris) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 80-83 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The line of sight to Beta CM a was probed by Copernicus observations. This particular line of sight is remarkable for the low mean densities. The density was found to be bar N sub H approximately .002/cu cm. Two separate regions were distinguished: (1) A local nearby HI region extends over a few parsecs from the Sun with a density of the order of 0.1/cu cm and a temperature of 11000 to 12500 K; (2) An HII region lies somewhere beyond the HI region and is spread over about 60pc. Its total hydrogen mean density is of the same order as the HI region, i.e., of approximately 0.1 cu cm and it contains only elements in low ionization state. All the ata are coherent with the picture of a cloud in ionization equilibrium at T approximately 23000 deg K. R.J.F.

N85-15552*# Institut d'Astrophysique, Paris (France).
DEUTERIUM ABUNDANCE IN THE LOCAL INTERSTELLAR MEDIUM
R. Ferlet, C. Gry (IUE Observatory, Madrid), and A. Vidal-Madjar *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 84-88 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The present situation of deuterium abundance evaluation in interstellar space is discussed, and it is shown that it should be < or = .00001 by studying in more detail lambda the Sco line of sight and by observing two NaI interstellar components toward that star, it can be shown that the D/H evaluation made toward lambda Sco is in fact related to the local interstellar medium (less than 10 pc from the Sun). Because this evaluation is also < or = .00001 it is in striking contrast with the one made toward alpha Aur (D/H > or = .000018 confirming the fact that the deuterium abundance in the local interstellar medium varies by at least a factor of two over few parsecs. R.J.F.

N85-15553*# S M Systems and Research Corp., Lanham, Md.
IUE OBSERVATIONS OF THE GASEOUS COMPONENT OF THE LOCAL INTERSTELLAR MEDIUM

Daya P. Gilra *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 89-90 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Discovery of interstellar Ge, Ga, and Kr is reported. Several intercombination lines of Fe 2 are detected. The depletion is most pronounced in Ca, Ti, and V. The highly ionized gas C 4 and Si 4 is not co-extensive with the Si 2 and C 2 gas nor with the O 6 gas. The molecular gas (CO) shows very small velocity dispersion (b approximately 1 km/sec). HD 149404 has the richest interstellar spectrum (except molecules) of all the stars in this study. HD 147889, the heavily obscured star in the Rho Oph cloud, has the strongest interstellar CO spectrum. Noisy nature of the spectra precludes detection of other molecules. R.J.F.

N85-15554*# Arizona Univ., Tucson. Lunar and Planetary Lab.
VOYAGER EUV AND FUV OBSERVATIONS
J. B. Holberg *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 91-95 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The Voyager 1 and 2 ultraviolet spectrometers are sensitive over the wavelength range 500 to 1700 A. In the extreme ultraviolet (EUV), at wavelengths shortward of the Lyman limit (912 A), Voyager observations detected emission from three out of a sample of 11 nearly hot DA white dwarfs. These observations imply very low HI column densities in the directions of the three stars detected. In the far ultraviolet (FUV), at wavelengths between 912 and 1200 A, Voyager observations of O and B stars can be used to study interstellar reddening at the shortest wavelengths and to provide useful estimates of interstellar H2 column densities. R.J.F.

N85-15555*# Wisconsin Univ., Madison. Dept. of Physics.
OPTICAL EMISSION LINE STUDIES AND THE WARM, IONIZED COMPONENT OF THE LOCAL INTERSTELLAR MEDIUM
R. J. Reynolds *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 97-108 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Observations of diffuse, galactic H alpha, [N2] lambda 6583, and [S2] 6716 emission lines provide evidence for a warm (10,000K), primarily ionized component of the interstellar medium distribution throughout the galactic disk. This component of the interstellar gas has an electron density approximately equals 0.1-0.2/cu cm and occupies about 10 to 30% of the interstellar volume. Interstellar H alpha emission near the galactic poles, the dispersion measure of a nearby pulsar, and observations of interstellar gas flowing into the solar system indicate that this ionized component is an important constituent of the interstellar medium in the solar neighborhood. The intensity of the H alpha background at high galactic latitudes implies that this component is maintained by an average hydrogen ionization rate in the vicinity of the Sun of (2-4) x 100,000 s(-1) per square cm of galactic disk. The emission measure is 1.3 to 2.3 cm (-6) pc toward the galactic poles. The sources of this ionization were not identified but may include escaping Lyman continuum radiation from planetary nebulae, hot white dwarfs, and early type stars. R.J.F.

N85-15556*# European Southern Observatory, Santiago (Chile).
A HIGH-RESOLUTION STUDY OF LOCAL INTERSTELLAR SODIUM
A. Ardeberg, H. Lindgren, and E. Maurice *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 109-112 Prepared in cooperation with Lund Observatory, Sweden and Observatoire de Marseille, France (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

A high-resolution spectroscopic investigation was made of interstellar lines of sodium. From identifications of D1 and D2 line components concentrations of interstellar sodium gas were studied. Some preliminary data are provided on the spatial distribution of stronger sodium concentrations. R.J.F.

N85-15557*# Chicago Univ., Ill. Astronomy and Astrophysics Center.
OPTICAL OBSERVATIONS OF NEARBY INTERSTELLAR GAS
P. C. Frisch and Donald G. York *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 113-116 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Observations indicated that a cloud with a heliocentric velocity of approximately -28 km/s and a hydrogen column density that possibly could be on the order of, or greater than, 5 x 10 to the 19 power/square cm is located within the nearest 50 to 80 parsecs in the direction of Ophiuchus. This is a surprisingly large column density of material for this distance range. The patchy nature of the absorption from the cloud indicates that it may not be a feature with uniform properties, but rather one with small scale structure which includes local enhancements in the column density. This cloud is probably associated with the interstellar cloud at about the same velocity in front of the 20 parsec distant star alpha Oph (Frisch 1981, Crutcher 1982), and the weak interstellar polarization found in stars as near as 35 parsecs in this general region (Tinbergen 1982). These data also indicate that some portion of the -14 km/s cloud also must lie within the 100 parsec region. Similar observations of both Na1 and Ca2 interstellar absorption features were performed in other lines of sight. Similar interstellar absorption features were found in a dozen stars between 20 and 100 parsecs of the Sun. R.J.F.

N85-15558*# Illinois Univ., Urbana-Champaign. Dept. of Astronomy.
DISTANCES OF LOCAL CLOUDS FROM OPTICAL LINE OBSERVATIONS
Richard M. Crutcher and David J. Lien *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 117-121 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The interstellar D-line of Na 1 toward 49 stars were observed in order to determine the distance (125 plus or minus 25 pc) to a cold H 1 cloud. This sheet of gas may be part of the back side of the shell formed by the Loop I supernova. R.J.F.

N85-15559*# Copenhagen Observatory (Denmark).
LOCAL INTERSTELLAR EXTINCTION WITH AN EMPHASIS ON UVBY BETA RESULTS
Jens Knude *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 123-144 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Some theories concerning the distribution of interstellar dust are surveyed. Average reddening and the distribution of local dust studied by means of ultraviolet photometry are discussed. The existence of local dust in the pole directions, local voids, variations of color excess with distance, and properties of local diffuse dust clouds are among the topics considered. R.J.F.

N85-15560*# Leiden Univ. Observatory (Netherlands).
OPTICAL POLARIZATION AS A PROBE OF THE LOCAL INTERSTELLAR MEDIUM
J. Tinbergen *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 145-148 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The use of interstellar polarization as a tool for measuring interstellar dust is discussed. Problems resulting from dust and magnetic field configurations becoming mixed up are discussed, as is the availability of sufficiently bright stars to obtain the photons needed for precision measurements. It is proposed that: (1) on the scale of several hundred parsec, there is a preferential magnetic field direction, as evidenced by observations at the Galactic poles and selected longitudes in the Galactic plane; (2) the local ($r < 50$ pc) region is devoid of dust, as evidenced by the mean square degree of polarization as a function of distance; and, less certainly, that (3) at a distance of less than 5 pc, there is a patch of dust which may be of interest in connection with cloud models. R.J.F.

N85-15561*# Copenhagen Observatory (Denmark).
DO THE ARCHING HI FILAMENTS SHOW IN LOCAL REDDENING DATA?
Jens Knude *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 149-153 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Probable dust counterparts of arching structures are investigated in two cases: (1) the Eridanus expanding shell; and (2) the extended Sco-Cen feature. Color excess data may be used to derive distance and dimension estimates of these structures. Color excesses from two areas SA 121 and SA 144 situated on the position of the 3.2 to 6.3 km/s velocity-slice are applied. Some stratification of the color excesses is noticed for both areas but extreme patchiness typifies particularly the dust in the SA 144 region. B.W.

N85-15562*# Princeton Univ. Observatory, N. J.
OBSERVATIONS OF ABSORPTION LINES FROM HIGHLY IONIZED ATOMS
Edward B. Jenkins *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 155-168 refs (For primary document see N85-15539 06-90)
(Grant NAGw-477)
Avail: NTIS HC A16/MF A01 CSCL 03C

In the ultraviolet spectra of hot stars, absorption lines can be seen from highly ionized species in the interstellar medium. Observations of these features which have been very influential in revising the perception of the medium's various physical states, are discussed. The pervasiveness of O 6 absorption lines, coupled with complementary observations of a diffuse background in soft X-rays and EUV radiation, shows that there is an extensive network of low density gas (n approx. fewX 0.001/cucm) existing at coronal temperatures, 5.3 < or = log T < or = 6.3. Shocks created by supernova explosions or mass loss from early-type stars can propagate freely through space and eventually transfer a large amount of energy to the medium. To create the coronal temperatures, the shocks must have velocities in excess of 150 km/sec; shocks at somewhat lower velocity 9v < or = 100 km/sec) can be directly observed in the lines of Si3. Observations of other lines in the ultraviolet, such as Si 4V and C 5, may highlight the widespread presence of energetic uv radiation from very hot, dward stars. More advanced techniques in visible and X-ray astronomical spectroscopy may open up for inspection selected lines from atoms in much higher stages of ionization. B.W.

N85-15563*# Space Telescope Science Inst., Baltimore, Md.
ABSORPTION AND EMISSION OF EUV RADIATION BY THE LOCAL ISM
Francesco Paresce *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 169-184 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The Berkeley extreme ultraviolet radiation (EUV) telescope flown on the Apollo Soyuz mission in July, 1975 established the existence of a measurable flux of EUV (100 lambda < or = < or = 1000 A) originating from sources outside the solar system. White dwarfs, flare stars and cataclysmic variables were dicovered to be relatively intense compact sources of EUV photons. Moreover, this and other subsequent experiments have strongly suggested the presence of a truly diffuse component of the FUV radiation field possibly due to thermal emission from hot interstellar gas located in the general vicinity of the Sun. Closer to the H1, 912 A edge, the effect of a few hot O and B stars has been shown to be very important in establishing the interstellar flux density. All these results imply that the local interstellar medium (ISM) is immersed in a non-negligible EUV radiation field which, because of the strong coupling between EUV photons and matter, will play a crucial role in determining its physical structure. The available information on the local ISM derived from the limited EUV observations carried out so far is assembled and analyzed. These include measurements of the spectra of bright EUV sources that reveal clear evidence of H photo absorption at lambda < 400 A and of the He ionization edge at 228 A. B.W.

N85-15564*# Osservatorio Astronomico, Trieste (Italy).
DETECTION OF NARROW C 4 AND SI 4 ABSORPTION FEATURES IN SPECTRA OF STARS WITHIN 200 PC F THE SUN
P. Molaro, J. E. Beckman (Queen Mary Coll., London), M. Franco (Inst. Astronomia y Fisica del Espacia), C. Morossi, and M. Ramella *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 185-188 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Detection of narrow (Beta lambda < 0.5 A) absorption features in C 4 at lambda lambda 1548 and 1550 have been made in the spectra of 4 late B dwarfs within 200 pc of the Sun; the Si4 doublet at lambda lambda 1393 and 1403 shows up in two of them. It is argued that it is difficult to account for the strengths, widths, shapes, and C IV/Si IV ratios in terms consistent with a circumstellar origin except possibly for an asymmetric C IV component in one star (HD 185037). The most probable source is semi-torrid gas in the 50,000 K range forming the interfaces between cooler H 1 clouds and the ambient medium at coronal temperatures. Late B rapid rotators are used for local interstellar medium probing of this kind. B.W.

N85-15565*# Yerkes Observatory, Williams Bay, Wis.
OBSERVATIONS OF HIGHLY-IONIZED INTERSTELLAR IRON
L. M. Hobbs *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 189-193 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The spectra of 24 stars, including 5 at distances d < 200 pc, have been observed in the regions of the coronal [Fe X] lambda 6375 and [Fe X] lambda 5303 lines at detection limits near an equivalent width of 1 mA in the best cases. In general agreement with predictions based on a multi-phase model of the interstellar medium, no absorption which can be attributed to Fe X or Fe X4 ions in hot interstellar gas emitting the soft X-ray background is seen in any of these spectra, except for two. Toward lambda Cephei an absorption line near lambda 6375 is measured with an equivalent width of 8.1 + or - 2 mA, a width corresponding to 20 + or - 5 km/sec or a temperature T < or = (0.5 + or - 0.25) x 10 to the 6th power K, and, if it is caused by Fe X ions, a radial velocity of -355 km/sec. On that hypothesis, the interstellar gas constitutes at least 63% of the column density of gas along this light path. Author

N85-15566*# Wisconsin Univ., Madison. Dept. of Physics.
THE SOFT X-RAY DIFFUSE BACKGROUND: IMPLICATIONS FOR THE NATURE OF THE LOCAL INTERSTELLAR MEDIUM
Dan McCammon *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 195-203 refs (For primary document see N85-15539 06-90)
(Grant NGL-50-002-004)
Avail: NTIS HC A16/MF A01 CSCL 03C

Observations of the diffuse X-ray background in the B and C bands (130-188 eV and 160-284 eV, respectively) provide convincing evidence for the existence of high-temperature interstellar gas. Since the opacity of normal interstellar material is very high, it is assumed that the soft X-ray flux observed in the galactic plane originates within a few hundred parsecs of the Sun. The intensity and B/C ratio of this low-latitude flux can be provided by emission from an equilibrium plasma with normal abundances, T =10 to the 6th power K, and 0.0019 cm(-6) pc emission measure. More sophisticated nonequilibrium models of material heated by a supernova blast wave would reduce the required emission measure somewhat, but not by so much as a factor of two. Arbitrarily limiting the pressure to 10 to the 4th power cm(-3) K gives a maximum density of 0.005 cm(-3) and a minimum radius for the emitting region of 75 pc. This fits in well with ultraviolet interstellar absorption measurements which indicate that the interstellar medium is very deficient in neutral hydrogen out to approx. 100 pc from the Sun. B.W.

N85-15567*# Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
NON-LOCAL ORIGIN OF A SUBSTANTIAL PORTION OF THE SOFT X-RAY BACKGROUND
George W. Clark *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 204-210 refs (For primary document see N85-15539 06-90)
(Contract NAS5-24441)
Avail: NTIS HC A16/MF A01 CSCL 03C

Comparison of the SAS-3 soft X-ray sky survey with the 21-cm neutral hydrogen survey confirms the well-known anticorrelation between the counting rates in the C-band (0.10-0.28 keV) and the column density of neutral hydrogen, and demonstrates that this anticorrelation is significant on all angular scales ranging from that of the general trend from the galactic equator to the poles down to the angular resolution of the detector (2.07 FWHM). Numerous instances of what appear to be soft X-ray shadows of nearly (100-300 pc) 21-cm features, and several bright X-ray regions coincident with holes in the interstellar medium are included in this general correlation. The final set of selected data has an exposure of 2.2 x 10 to the 4th power/sq cm s sr, a sky coverage of 80%, and is free of spurious effects due to charged particles and solar radiations. The validity of the two-component model of the X-ray background, introduced by Davidsen et al. (1977) is examined. In this model the C-band intensity in a given direction is represented as a sum of a constant term, I sub 1, due to unattenuated emission from a local hot bubble in which the solar system is immersed, and a term, I sub 2 exp [(N sub H sub th)], due to emission from a diffuse source beyond the neutral hydrogen 2.g., the galactic corona). B.W.

N85-15568*# Wisconsin Univ., Madison. Space Physics Lab.
THE NATURE OF THE SOFT X-RAY EMITTING REGION IN THE DIRECTION OF THE NORTH POLAR SPUR
James P. Morrison and Wilton T. Sanders *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 211-214 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The spatial structure of the X-ray sky in the direction of the North Polar Spur was examined in two energy bands, the B band (0.10 to 0.18 keV) and the C band (0.15 to 0.28 keV). A model with two emitting regions, one local with unabsorbed emission, and the other more distant with emission partially absorbed by spatially varying amounts was investigated. Using the distribution of atomic hydrogen as a measure of absorbing material, this model was used to predict the flux in the direction of the North Polar Spur. The predicted flux was compared to the data obtained from several sounding rocket flights. The derived flux was found to correlate well with the observed data. Author

N85-15569*# Pennsylvania State Univ., University Park. Dept. of Astronomy.
LOCAL CONTRIBUTIONS TO THE 0.6 KEV DIFFUSE X-RAY BACKGROUND
David N. Burrows *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 215-218 refs (For primary document see N85-15539 06-90)
(Contract NAS5-26809)
Avail: NTIS HC A16/MF A01 CSCL 03C

The intensity of the X-ray background between 0.5 and 1.0 keV has surprisingly little dependence on galactic latitude. Possible mechanisms for the production of these X-rays include extragalactic emission and emission from dM stars, both of which should be strongly dependent on galatic latitude, and diffuse emission from hot gas (T approx. = 3 x 10 to the 6th power K) surrounding the Sun. These mechanisms can be distinguished by the presence or absence of absorption by gas within a few hundred parsecs of the Sun. X-ray data from the HEAO-1 LED detectors and H1 data from the recent Crawford Hill 21 cm survey are used to place limits on the 0.6 keV intensity originating within 300 pc of the Sun in the general direction of (lambda,b) = (150 deg - 30 deg). B.W.

N85-15570*# Pennsylvania State Univ., University Park. Dept. of Astronomy.
HEAO-1 DIFFUSE SOFT X-RAY SKY MAPS
John A. Nousek, Gordon P. Garmire, and George Weaver *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 219-221 ref (For primary document see N85-15539 06-90)
(Contract NAS5-52049)
Avail: NTIS HC A16/MF A01 CSCL 03C

Maps of the diffuse X-ray background intensity are presented, spanning four energy intervals. The lowest energy interval (0.18 to 0.56 keV) is dominated by local emission, while the next two intervals (0.56 to 1.0 keV and 1.0 to 1.4 keV) reveal more distant and more sharply defined structures. Enlarged maps of several of these structures are presented, including the North Polar Spur, the Galactic Center region and the Eridanus Loop. Author

N85-15571*# Wisconsin Univ., Madison. Dept. of Physics.
ULTRASOFT X-RAY BACKGROUND OBSERVATIONS OF THE LOCAL INTERSTELLAR MEDIUM
W. T. Sanders, S. L. Snowden, J. J. Bloch, M. Juda, K. M. Jahoda, and Dan McCammon *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 222-225 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Preliminary results from a May 8, 1984 sounding rocket survey of the soft X-ray background are presented. The X-ray detectors are sensitive to X-rays in three soft X-ray bandpasses: 80 to 110 eV, 90 to 188 eV, and 284 to 532 eV (at 20% of peak response). The lowest energy X-rays in this range have a mean free path of order 10 to the 19th power/sq cm and provide information about the local interstellar medium. The count rate in the 80 to 110 eV energy band (the Be band) tracks the 90 to 188 (eV band (the B band) very well, indicating that the same approx. 1 million degree gas that is responsible for the B band emission may be responsible for the bulk of the Be band X-rays as well. B.W.

N85-15572*# Copenhagen Observatory (Denmark).
INVERSE RELATIONS BETWEEN 0.25 KEV COUNTS AND LOCAL INTERSTELLAR DUST
Jens Knude, P. Jakobsen, S. Labov (California Univ., Berkeley), and S. Bowyer (California Univ., Berkeley) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 226-228 (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Color excesses and HEAO-1, A2 0.25 keV counts were compared on two angular levels. Indications of local photoelectric absorption are investigated. B.W.

N85-15573*# Maryland Univ., College Park. Astronomy Program.
MOLECULAR CLOUDS WITHIN 100 PC
Leo Blitz, Loris Magnani, and Lee Mundy (Texas Univ.) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 231-234 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Observations at the 2.6 mm line of CO reveal the presence of a large number of molecular clouds at high galactic latitude. If the velocity dispersion of the clouds is a measure of their scale height, the mean distance of the ensemble detected is 100 pc. The clouds are unusual in that either they are not gravitationally bound or they are very deficient in CO relative to molecular hydrogen. These clouds represent a heretofore unrecognized component of the local interstellar medium. If they are pervasive in the Milky Way, they probably represent the small molecular cloud component of the interstellar medium. Author

N85-15574*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
A WIDE LATITUDE CO SURVEY OF MOLECULAR CLOUDS IN THE NORTHERN MILKY WAY
T. M. Dame and P. Thaddeus *In* NASA. Goddard Space Flight

Center Local Interstellar Medium, No. 81 Nov. 1984 p 235-238 refs Prepared in cooperation with Columbia Univ., New York (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

It is now well established that molecular clouds are an important part of the interstellar medium, containing much or most of the dense, cold component of the gas, and producing the massive stars and supernovae responsible for the diffuse, hot component. It would therefore appear essential in formulating a complete picture of the local interstellar medium to have some knowledge of the distribution and properties of nearly molecular clouds. The Goddard-Columbia 1.2 meter telescope was used to carry out a wide latitude, low angular resolution survey of CO along most of the first galactic quadrant and a small part of the second. A plane-of-the-sky map, which resulted from numerically integrating the survey over radial velocity, is presented. The Great Rift and the Aquila Rift molecular clouds of the Milky Way are discussed.
R.S.F.

N85-15575*# Ruhr Univ., Bochum (West Germany). Astronomical Inst.
DARK CLOUD AND GLOBULE DISTRIBUTION FOR GALACTIC LONGITUDES 230 TO 360 DEGREES
J. V. Feitzinger and J. A. Stuewe *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 239-242 ref (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

A catalogue of dark nebulae and globules was compiled from a study of the ESO-B and SRC-J sky atlas for galactic longitudes 230 deg $< 1 <$ 360 deg. This catalogue closes the great southern gap open since the work of Lynds (1962). Listed were 489 dark nebulae and 311 globules. The catalogue contains positions, sizes, opacities, and the van den Bergh classification on the filamentary morphology of dark clouds. Statistics are presented concerning the northern and southern distributions and sizes of the nebulae.
Author

N85-15576*# Bonn Univ. (West Germany). Radioastronomisches Inst.
A NEUTRAL GAS JET IN A LOW VELOCITY SHOCK FRONT AT THE BOUNDARY OF THE DRACO NEBULA
P. W. M. Kalberla, U. Herbstmeier, and U. Mebold *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 243-247 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Twenty-one cm line observations with the Westerbork Synthesis Radio Telescope of a dust and molecular filament at the boundary of the Draco Nebula reveal a jet like neutral hydrogen feature funneling through an outlet in the low velocity shock front at the interface between the Draco Nebula and the surrounding gas. The jet like feature is apparently connected with a high velocity filament at VLSR = -180 km/sec. It is suggested that soft X-ray emission observed in the area is thermal bremsstrahlung produced by the deceleration of high velocity gas in galactic gas.
Author

N85-15577*# Bonn Univ. (West Germany). Radioastronomisches Inst.
THE DRACO NEBULA, A MOLECULAR CLOUD ASSOCIATED WITH A HIGH VELOCITY CLOUD?
U. Mebold and P. W. M. Kalberla *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 249-252 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Extended and very faint bright nebulae are found in high galactic latitudes at the Palomar Observatory Sky Survey. Such a nebula, located in the constellation Draco and called Draco Nebula or Dracula, was found to be in detailed positional coincidence with a 21 cm emission line feature. Estimates of the minimum visual extinction from star counts ON and OFF Dracula and an estimated visual surface brightness indicate that Dracula fits the relation SBV = 24.2 - 2.5 log AV for dust clouds located above the galactic plane and reflecting the integrated starlight of the galactic disk. Hence Dracula is probably a reflection nebula. Indicators of molecular hydrogen in Dracula, molecules such as CO, were searched for by using a 2.5-m mm-telescope. Molecular hydrogen column densities were estimated. The dynamics of CO clumps was studied. Dracula has a close positional and possibly even astrophysical relationship to the high velocity cloud phenomenon.
R.S.F.

N85-15578*# Minnesota Univ., Minneapolis.
THE SMALLEST SIZES OF DIFFUSE INTERSTELLAR CLOUDS
John M. Dickey, J. Crovisier, and I. Kazes *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 258-262 refs Prepared in cooperation with Observatoire de Paris (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

By observing the difference in optical depths between absorption spectra toward the two components of double sources, the variations in opacity over lengths of less than 0.1 up to 10 pc inside diffuse interstellar clouds were measured. Significant variations were detected on scales larger than about 0.2 pc, but not less. This may represent the minimum size for diffuse cloud structure. By comparing the variations of Gaussian fitted line parameters, it was found that variations in the internal velocity field of diffuse clouds explain the data better than tiny independent cloudlets.
Author

N85-15579*# California Univ., Berkeley. Dept. of Astronomy.
A WARM MAGNETOACTIVE PLASMA IN A LARGE VOLUME OF SPACE
Carl Heiles *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 263-268 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

A diffuse ionized warm gas fills a large volume of space in the general direction of Radio Loop II. There are three types of observational evidence: Faraday rotation measures (RM's) of extragalactic sources; emission measures (EM's) derived from the H alpha emission line in the diffuse interstellar medium; and magnetic field strengths in HI clouds derived from Zeeman splitting observations.
R.S.F.

N85-15580*# California Univ., Berkeley.
THE Z-DEPENDENCE OF THE SPIN TEMPERATURE OF HI
Shrinivas R. Kulkarni, Carl Heiles, J. VanGorkom (National Radio Astronomy Observatory, Socorro, N. Mex.), and John M. Dickey (Minnesota Univ., Minneapolis) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 269-273 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Results relating to the following aspects of hydrogen clouds are presented: (1) the vertical distribution of cold H T clouds; (2) possible systematic warming of H T clouds at high absolute values of z; (3) possible increase of the fraction of warm intercloud medium H T with high absolute values of z; and (4) the effect of optical depth on previous H T emission surveys.
R.S.F.

N85-15581*# Illinois Univ., Urbana-Champaign.
POLARIZATION OF RADIO MOLECULAR LINES AND MAPPING OF MAGNETIC FIELD DIRECTION
Shuji Deguchi and William D. Watson *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 274-275 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Two level calculations by others for the linear polarizations expected for molecular emission lines from interstellar clouds are extended by considering a number of coupled rotational states of a diatomic molecule. Higher transitions commonly have strengths comparable with that of the J=1-0 transition so that depolarization due to coupling between the various J states might be expected to reduce the predicted linear polarization. The significance of the null observational results obtained recently by Wannier, Scoville, and Barvainis is assessed. The inclusion of additional states tends

to decrease the maximum polarizations, though the calculated polarization is increased under conditions for which superthermal excitation occurs. Author

N85-15582*# Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.
NEARBY MOLECULAR HYDROGEN
F. Lebrun *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 277-279 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

If the gas-to-dust ratio is sufficiently uniform throughout the local interstellar medium, galaxy counts may provide a useful probe of the large scale structure of the interstellar gas. This idea substantiated by gamma ray observations led to the discovery of nearby molecular cloud complexes. The reddening studies indicate that one of them lies between 80 and 140 pc from the Sun. From CO observations, its molecular mass is estimated to be a few 1000 stellar mass units. Author

N85-15583*# National Radio Astronomy Observatory, Socorro, N. Mex.
RADIO AND UV OBSERVATIONS OF HIGH LATITUDE HI Abstract Only
Felix J. Lockman, L. M. Hobbs (Yerkes Observatory), and J. Michael Shull (Joint Inst. for Lab. Astrophysics) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 290 (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Interstellar Lyman alpha observations toward high latitude stars, which give the column density of H I between Earth and the star, and 21 cm radio observations, which give the total H I column density to and beyond the star, can be combined to map out the amount of neutral gas as a function of distance from the Sun. Observations of the 21 cm and Lyman alpha lines made toward approximately 50 high latitude OB stars are presented. These data are used to discuss the distribution of H I in the solar neighborhood. Author

N85-15584*# Princeton Univ., N. J. Dept. of Physics.
THE PARALLAX OF PULSAR 0950+08 AND THE LOCAL FREE ELECTRON DENSITY
C. R. Gwinn, J. H. Taylor, J. M. Weisberg, and L. A. Rawley *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 281-283 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

A parallax of 7.9 + or - 0.8 mas for PSR 0950+08, corresponding to a distance of 130 + or - 15 pc is reported. The measured pulse dispersion of this pulsar implies an average free electron density of 0.023 + or 0.002/cu cm along the line of sight. This parallax measurement is subject to systematic errors and questions of interpretation which are not yet fully explored. Author

N85-15585*# Space Telescope Science Inst., Baltimore, Md.
MODELLING THE LOCAL INTERSTELLAR MEDIUM AS A SUPERNOVA REMNANT IN A MULTIPHASE GAS
Lennox L. Cowie *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 287-296 refs Prepared in cooperation with MIT, Cambridge (For primary document see N85-15539 06-90)
(Grant NAGw-464)
Avail: NTIS HC A16/MF A01 CSCL 03C

The construction of supernova remnant which is consistent with the observations and what it tells about the theory was investigated. It is argued that thermal evaporation and local inhomogeneity are crucial elements which are essential to any satisfactory description. It is concluded that: (1) a multiphase supernova remnant (SNR) seems to provide a plausible description of the local interstellar medium (ISM); (2) the local region could have been deficient in cool gas prior to the supernova both on theoretical and observational grounds; (3) the Sun may lie in a region towards the outside of the supernova remnant which hasn't yet come into pressure equilibrium with the hot gas; and (4) evaporative models give a much more satisfactory description of the O VI observations than Sedov Solutions. E.A.K.

N85-15586*# Wisconsin Univ., Madison. Space Physics Lab.
A MODEL OF THE SOFT X-RAY BACKGROUND AS A BLAST WAVE VIEWED FROM INSIDE
Richard J. Edgar and Donald P. Cox (Rice Univ.) *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 297-300 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The suggestion that the soft X-ray background arises in part from the Sun which is inside a large supernova blastwave was examined by models of spherical blastwaves. The models can produce quantitative fits to both surface brightnesses and energy band ratios when t = 10 to the 5th power E sub o = 5 x 10 to the 50th power ergs, and n sub approx. 0.004 cm to the -3 power. The models are generalized by varying the relative importance of factors such as thermal conduction, Coulomb heating of electrons, and external pressure; and to allow the explosions to occur in preexisting cavities with steep density gradients, or by examination of the effects of large obstructions or other anisotrophies in the ambient medium. E.A.K.

N85-15587*# Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.
NON EQUILIBRIUM IONIZATION IN THE LOCAL HOT BUBBLE
M. Arnaud, R. Rothenflug, and R. Rocchia *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 301-304 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The existence of a local hot bubble surrounding the solar system was shown by soft X-ray surveys. The spectrum of this hot interstellar medium was measured with solid state detectors during rocket flights between 300 and 1000 eV. The good resolution of the experiment permitted to measure C V, C VI and O VII line emissivities with good accuracy. These data are used to put some constraints on a model where the emission comes from a supernova remnant expanding in a finite pressure medium. The importance of nonequilibrium ionization phenomena is shown. E.A.K.

N85-15588*# Sternberg Astronomical Inst., Moscow (USSR).
LARGE-SCALE BUBBLE STRUCTURE OF THE INTERSTELLER MEDIUM (ISM) AND PROPERTIES OF THE LOCAL SPIRAL ARM (LSA)
Nikolay G. Bochkarev *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 305-310 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

Bubbles which are very common structure units in the Galaxy and galaxies were examined. Collection of radio, optical, infrared and X-ray observations of the Cyg superbubble (CSB) region of the sky show that the CSB is not a single bubble object. Between 50 to 75 percent of its X-ray emission is ascribed to discrete sources. The other 25 to 50% X-ray emission, probably originates from bubbles around 8 OB associations of the region. All bubbles located within the spiral structure of Galaxy, M31 and M33 have diameter < 300 pc. The large distance of stellar association from the galactic plane (GP) combined with picture of the gas distribution within the LSA shows that a Reyleigh-Taylor instability in the LSA can develop and give use to the formation of compact stellar clusters, such as the Cyg OB2 association. Development stages of the Reyleigh-Taylor instability, some peculiarities of the dust distribution and departures of the local structure from the galactic grand design suggest the absence of a spiral shockwave in the LSA. E.A.K.

N85-15589*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
STROMGREN TRAILS OF HOT WHITE DWARFS

John C. Raymond *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 311-314 refs (For primary document see N85-15539 06-90)
(Grant NAG5-87)
Avail: NTIS HC A16/MF A01 CSCL 03C

High resolution IUE spectra of Feige 24 reveal sharp C IV absorption features at both the stellar velocity and the velocity of the interstellar lines. It was shown that the ionization zone created by Feige 24 itself accounts for the interstellar components of C IV and Si IV, and that the density of hot white dwarfs in the galaxy implies that similar ionized zones around hot white dwarfs make a significant contribution to the C IV column densities observed toward distant O and B stars. Typical white dwarf velocities of around 30 km/s and C IV ionization zone diameters less than 1 pc imply that the crossing time is comparable to the ionization time, so that nonequilibrium ionization models are required. Models of the resulting elongated trails are presented. E.A.K.

N85-15590*# Belgian Royal Observatory, Uccle.
MAGNETIC ALIGNMENT THEORY AND THE INTERPRETATION OF POLARIZATION
Pierre Cugnon *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 315-318 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The theory of magnetic spinning alignment is outlined. It is shown that a classical enhanced thermal Davis and Greenstein mechanism may be considered as a limiting case of Purcell's suprathermal spinning alignment theory when the number of active sites on a given grain becomes very important and/or for very short lived suprathermal sites. The results are applied to the interstellar medium and some problems in which it may be important are discussed. E.A.K.

N85-15591*# British Columbia Univ., Vancouver. Dept. of Physics.
KINEMATICS OF NEARBY GAS AND STARS
Thomas Goulet and William L. H. Shuter *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 319-325 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The kinematic properties of gas and stars in the solar neighborhood are described in terms of the line of sight component of a three dimensional first order Taylor series expansion of the local velocity field. The types of object analyzed are: (1) 21 cm absorbing clouds; (2) intercloud medium; (3) main sequence B-stars closer than 200 pc; (4) B-stars of luminosity class ranging from I to IV; (5) main sequence A stars; (6) K-giant stars. The least squares fitting procedure used to derive the 10 coefficients describes each of the six velocity fields was essentially the same for comparison. Marked departures from circular motion are found in most cases, but the only systematic trend is a correlation between delta u/delta x and stellar spectral type, where the gas behaves like a medium younger than the early type stars. It is indicated that the standard plane-parallel model provides a good description for the intercloud medium, but is inadequate for the absorbing clouds. A velocity ellipsoid description of the residuals is presented for each type of object. The influence of the Gould belt on local kinematics is discussed. E.A.K.

N85-15592*# Institute for Advanced Study, Princeton, N.J.
DARK MATTER NEAR THE SUN: SIMULATED STAR COUNTS AND THE OORT LIMIT
David Gilden and John N. Bahcall *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 326-331 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

An ensemble of orbits passing through the solar position was generated for a specific mass model of the galaxy. These orbits are randomly sampled to form simulated density distributions of tracer stars perpendicular to the galactic disk. The simulated distributions are analyzed to determine the sampling errors in a self consistent derivation of the total amount of matter near the Sun (the Oort limit). E.A.K.

N85-15593*# Wisconsin Univ., Madison. Washburn Observatory.
FUTURE STUDIES OF THE LOCAL INTERSTELLAR MEDIUM WITH SPACE TELESCOPE AND COLUMBUS
Blair D. Savage *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 333-343 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The spectrographs aboard Space Telescope and Columbus which will provide important new information about the interstellar medium in the immediate vicinity of the sun are described. The space telescope's highest resolution is adequate to define the multicomponent nature of interstellar absorption lines and to measure thermal line widths exceeding 3 km/s. The Columbus spacecraft will contain spectrographs capable of resolutions of 3 x 10 to the 4th power between 912 and 1200 A and 500 between 100 and 900 A. In the short wavelength region, lines of He I and II, are observable. If the 3 x 10 to the 4th power resolution spectrograph provides extended wavelength coverage to 770 A, lines of Ne VIII which are expected from 8 x 10 to the 5th power K gas are accessible. The ST HRS and Columbus spectrographs enable the study of a wide range of problems relating to cold, warm, and hot gas in the local ISM. E.A.K.

N85-15594*# California Univ., Berkeley. Space Sciences Lab.
OBSERVATIONS OF LOCAL ISM EMISSION WITH THE BERKELEY EUV/FUV SHUTTLE TELESCOPE
Christopher Martin and Stuart Bowyer *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 344-347 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

The Berkeley extreme ultraviolet/far ultraviolet shuttle telescope (BEST) will be launched on the Space Shuttle as part of the NASA UVX project. The Berkeley spectrometer will make observations of the cosmic diffuse background in the 600 to 1900 A band, with a spectral resolution of 10 A. The sensitivity and spectral resolution of the instrument make it ideal for the study of components of the interstellar medium in the 10 to the 4th power to 10 to the 6th power K range. E.A.K.

N85-15595*# California Univ., Berkeley. Space Sciences Lab.
MEASURING EUV LINE EMISSION FROM THE HOT INTERSTELLAR MEDIUM
Simon Labov, Christopher Martin, and Stuart Bowyer *In* NASA. Goddard Space Flight Center Local Interstellar Medium, No. 81 Nov. 1984 p 348-352 refs (For primary document see N85-15539 06-90)
Avail: NTIS HC A16/MF A01 CSCL 03C

In the local interstellar medium, the presence of hot gas was inferred from measurements of oxygen VI absorption in the ultraviolet, and from diffuse emission in the extreme ultraviolet (EUV) and soft X-ray regions. A spectrometer that is very sensitive to gas in this temperature range is described. The spectrometer uses an array of plane ruled gratings at grazing incidence in the extreme off plane mount. A set of Kirkpatrick-Baez mirrors focuses the conically diffracted light on to one of two microchannel plate detectors. The field of view of the instrument is 0.2 deg by 12 deg. The predicted sensitivity ranges from 50 to 200 ph/(sq cm sec str) with a resolving power of 15 to 50 over the 50 to 700 angstrom wavelength band. E.A.K.

N85-15596*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THEORETICAL STUDIES OF CHROMOSPHERES AND WINDS IN COOL STARS Semiannual Progress Report, 1 Apr. - 30 Sep. 1984
Lee Hartmann Dec. 1984 9 p refs
(Grant NAGw-511)
(NASA-CR-174204; NAS 1.26:174204; SAPR-2) Avail: NTIS

HC A02/MF A01 CSCL 03B

The atmospheres of hot pre-main sequence stars are discussed along with FU Orionis winds, h alpha emission from M dwarfs, and envelopes of T Tauri stars. In addition, extended chromospheres of M supergiants and metal deficiency giants are considered. R.S.F.

N85-15597# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
WAVES AND INSTABILITIES IN COLLISIONLESS SHOCKS Progress Report
D. A. Gurnett Apr. 1984 67 p
(Contract N00014-76-C-0016)
(AD-A146689; U-OF-Iowa-84-20) Avail: NTIS HC A04/MF A01 CSCL 04/1

By scattering particles and causing dissipation, waves in a collisionless shock play a role similar to collisions in an ordinary gas. In describing the waves and instability that occur near a shock three regions must be considered: (1) the transition region, (2) the upstream region, and (3) the downstream region. The transition region is usually characterized by an abrupt broadband burst of electrostatic noise extending to frequencies well above the ion plasma frequency, and by a broadband burst of whistler-mode electromagnetic noise at frequencies below the electron cyclotron frequency. The burst of electrostatic noise is believed to be the primary mechanism by which heating and dissipation takes place at the shock. This noise is believed to be ion-acoustic noise driven either by a current or an electron beam in the shock. Electrostatic lower-hybrid waves are also sometimes observed in the transition region. These waves are excited by ions reflected by the shock, and can be very effective at heating both ions and electrons. This paper reviews all of the above waves and comments on the similarities between waves observed near the bow shocks of Earth, Venus, Jupiter and Saturn, and interplanetary shocks. Possible mechanisms for generating each type of wave are also considered. GRA

N85-15598# Florida Univ., Gainesville. Dept. of Physics.
SUPERSYMMETRIC INFLATIONARY COSMOLOGY
R. Holman 1984 10 p refs Presented at the Inner Space/Outer Space Conf., Batavia, Ill., 2 May 1984
(Contract DE-AS05-81-ER-40008)
(DE85-001331; DOE/ER-40008/61; CONF-8405155-4) Avail: NTIS HC A02/MF A01

N=1 supergravity coupled to hidden sectors is used to construct a completely viable inflationary cosmological scenario. Contraints on the gravitino abundance allows for the prediction that (delta rho/rho) sub gal is approx. .0001 as required for galaxy formation. DOE

N85-15632*# Los Alamos Scientific Lab., N. Mex.
HOMOGENEOUS CONDENSATION OF GASEOUS MIXTURES OF Si, Fe, O, N, AND C IN RELATIVE COSMIC ABUNDANCE AND IMPLICATIONS FOR ASTRONOMICAL CONDENSATION Abstract only
J. R. Stephens *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

N85-15647*# McCrone (Walter C.) Associates, Inc., Chicago, Ill.
DISCOVERY OF NUCLEAR TRACKS IN INTERPLANETARY DUST Abstract only
John P. Bradley and Donald E. Brownlee (Washington Univ., Seattle) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N85-15599*# Lunar and Planetary Inst., Houston, Tex.
THE 47TH ANNUAL METEORITICAL SOCIETY MEETING
1984 209 p refs Meeting held in Albuquerque, N. Mex., 30 Jul. - 2 Aug. 1984; sponsored in cooperation with New Mexico Univ. and Los Alamos National Lab.
(NASA-CR-174071; NAS 1.26:174071; LPI-Contrib-537) Avail: NTIS HC A10/MF A01 CSCL 03B

Various topics in meteorology were discussed. Chondrites, comets, cosmic dust, irradiation effects, cosmic rays, achondrites, asteroids, and lunar craters were among the topics discussed. For individual titles, see N85-15600 through N85-15648.

N85-15600*# Carnegie Institution of Washington, D. C.
THE ASTEROIDAL SOURCE REGION OF ORDINARY CHONDRITES Abstract only
George W. Wetherill *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The final, Earth-impacting orbits of ordinary chondritic meteorites have a very special distribution. By use of visual radiant and time of fall data, as well as photographic fireball orbits (1) it is inferred that chondrite perihelia are concentrated near 1 A.U., eccentricities are usually rather high (approximately 0.5), and inclinations are low (approximately 10 deg). Velocity selection resulting from atmospheric ablation plays a significant role in determining this orbital distribution, but by no means suffices to explain it. The observed distribution is a fragile one, and can easily be destroyed by Earth and Venus perturbations. This places severe constraints on the location of the original source bodies, of which these meteorites are fragments. New calculations were made of the expected distribution of final orbits from a range of initial sources, taking into consideration close encounter planetary perturbations, secular resonance, destruction by collision in space, and atmospheric ablation. R.J.F.

N85-15601*# Muenster Univ. (West Germany).
BULK COMPOSITIONS OF Al-RICH CHONDRULES IN ORDINARY AND CARBONACEOUS CHONDRITES: VARIATIONS AND SIMILARITIES Abstract only
A. Bischoff *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

An extended study of ordinary chondrites revealed that chondrules exist which are transitional in composition between Al-rich and Mg-Fe-rich types in contrast to the finding of Wlotzka, who inferred a gap in compositions between the Ca-Al-rich and Mg-Fe-rich chondrules. Transitional chondrule bulk compositions are plotted. They show that no compositional gap exists between the Mg-Fe-rich and Al-rich chondrules. Chondrules with Na_2O-contents > 3.0 wt.% are indicated. Variable CaO/Na_2O-ratios for chondrule bulk compositions exist, similar to what was described for the subgroups of Al-rich chondrules. Al-rich and transitional chondrules similar to those described above were found also in carbonaceous chrondrites. Thirty-nine chondrules from the carbonaceous chondrites Leoville, Allende, Vigarano and Colony were investigated. Their bulk compositions in terms of Al_2O_3 vs. CaO were plotted. R.J.F.

N85-15602*# Ibaraki Univ., Hitachi (Japan). Dept. of Earth Sciences.
MAJOR ELEMENT CHEMICAL COMPOSITIONS OF CHONDRULES IN UNEQUILIBRATED CHONDRITES Abstract only

Y. Ikeda *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The chemical compositions (except for metals and sulfides in chondrules) of more than 500 chondrules from unequilibrated E, H, L, LL, and C chondrites were measured using a broad beam of an electron-probe microanalyzer. The compositions of chondrules can be represented by various mixtures of normative compositions of olivine, low-Ca pyroxene, plagioclase, and high-Ca pyroxene with minor amounts of spinel, feldspathoid, SiO2-minerals, etc., indicating that the chondrule precursor materials consisted of aggregates of these minerals. The Al, Na, and K contents of most chondrules reflect the compositions of the ternary feldspar (An-Ab-Kf) of the chondrule precursor materials, and chemical types of chondrules (KF, SP, IP, and CP) are defined on the basis of the atomic proportion of Al, Na, and K. R.J.F.

N85-15603*# New Mexico Univ., Albuquerque. Dept. of Geology.
FINE-GRAINED MILLIMETER-SIZED OBJECTS IN TYPE 3 ORDINARY CHONDRITES AND THEIR RELATION TO CHONDRULES AND MATRIX Abstract only
S. I. Recça, E. R. D. Scott, C. J. Taylor, and K. Keil *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Fine-grained, opaque, silicate-rich matrix material, occurring as rims on chondrules and clasts, discrete clasts, and between chondrule and mineral fragments is a primitive component of chondrites and may resemble the material from which chondrules formed. To elucidate the relationship between chondrules and matrix and to help identify chondrule precursor material, the nimeralogy and bulk compositions of 30 mm-sized, fine-grained objects in Tieschitz (h3.6), Sharps (H3.4), Allan Hills A77299 (H3.7), Yamato 74191 (L3.6), Semarkona (LL3.0), and St. Mary's Co. (LL3.3) were studied. All are composed of submicron to micron sized material and may contain larger mineral fragments. Three texturally and mineralogically distinct types of objects were identified; all are minor components of the chondrites studied (< 1% except Sharps where melt-breccia-textured objects are approximately minus 1%). Bulk compositions of network and melt-breccia-textured objects define a rather narrow trend on a plot of Si/Al vs. Mg/Al, emphasizing a possible genetic relationship. Data show that Si/Mg is higher for network and melt-breccia-textured objects than for porphyritic and barred olivine chondrules. Melting in vaccuo of network-textured objects would cause a loss of Si relative to Mg (3), suggesting that material compositionally similar to fine grained objects could have been precursors to some chondrules. R.J.F.

N85-15604*# Essex Univ., Colchester (England).
CHONDRULE RIMS AND INTERCHONDRULE MATRIX IN UOC Abstract only
C. Alexander, R. Hutchison (British Museum, London, England), and D. J. Barber *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Opaque rims around chondrules and clasts were distinguished from opaque, interchondrule matrix apparently unrelated spatially to chondrules and clasts. Microprobe and electron microscope techniques were used. The mean chemical composition for dark rim and matrix in Bishunpur and Tieschitz are similar to the opaque matrix of Huss, et al. However, the mean dark rim compositions in Bishunpur have significantly higher Fe, and lower Na, K, Al and Si than opaque interchondrule matrix. The opaque matrix of Huss, et al, essentially lies between these compositions. In Tieschitz only rim material was observed. In Tieschitz the rims are Si-poor and dominated by normative olivine (Fo50). Again there is an Na, K, Al component but is often nepheline normative rather than albitic. It too is probably present as glass, Ashworth (pers. comm.). In Bishunpur rims as well as the silicate-FeS, FeNi layering described by Allen, et al, discontinuous layering was observed within the silicate portion. This is apparently due to variations in the proportions of the components, particularly in the glassy phase. In Bishunpur there is a strong genetic link between matrix and rims, although rims seem to have formed under different, possibly more oxidizing, conditions. Also the presence of the same component in rims, matrix chondrules, and clasts suggests a common source. R.J.F.

N85-15605*# British Museum, London (England). Dept. of Mineralogy.
CHONDRULES IN THE BISHUNPUR L13 CHONDRITE Abstract only
R. Hutchison, C. Alexander (Essex Univ., Colchester, England), and D. J. Barber (Essex Univ., Colchester, England) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Twenty-six chondrules, chondrule fragments or clasts were analyzed. An automated wavelength dispersive instrument with a 90 micrometer beam integrated a series of analyses in traverses across each object. Depending on the size of the cross-sectional area, from 1 to 21 analyses were performed for each bulk analysis. Si, Ti, Al, Cr, Fe, Ni, Mn, Mg, Ca, Na, K and S were determined, and an analyzed augite was used as a secondary standard before and after each set of analyses. The work is part of a study of chondrule rims, interchondrule matrix, chondrules and clasts in unequilibrated ordinary chondrites. Only two of the twenty-six objects analyzed have Ca/Al atomic ratios greater than the ordinary chondritic average of 0.74. The bulk meteorite has a normal Ca/Al ratio, so presumably a Ca-rich, Al-poor component must be present to compensate for chondrules and chlasts. This component is unlikely to be rim or matrix, but may be phosphate associated with metal or sulphide. Na/Al ratios range from 1 to almost zero, but there is no hiatus as in a suite of Manych chondrules and glasses. R.J.F.

N85-15606*# Physical Research Lab., Ahmedabad (India).
SIZE DEPENDENCE OF CHONDRULE TEXTURAL TYPES Abstract only
J. N. Goswami *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Chrondrule textural types were studied for size sorted chondrules from the ordinary chondrites Dhajala, Eston and Chainpur and the CM chondrite Murchison. Aliquot samples from size sorted Dhajala chondrules were studied for their oxygen isotopic composition and chondrules from Weston were studied for their precompaction irradiation records by nuclear track technique. Correlations between chondrule textural types and oxygen isotope or track data were identified. A distinct dependence of chondrule textural type on chondrule size was evident in the data for both Dhajala and Weston chondrules. No significant deviation was noticed in the abundance pattern of nonporphyritic chondrules within individual size fractions in the 200 to 800 micron size interval. Overabundance is found of nonporphyritic chondrules in the 100 to 200 micron size fraction of Murchison chondrules, the trend is not as distinct for Chainpur chondrules. Two hundred microns is suggested as the cutoff size below which radiative cooling is extremely efficient during the chondrule forming process. It is suggested that this offers a possibility for use of physical and chemical characteristics of small chondrules to constrain the temperature history during the chondrule formation process. E.A.K.

N85-15607*# Physical Research Lab., Ahmedabad (India).
ATMOSPHERIC HEATING OF METEORITES: RESULTS FROM NUCLEAR TRACK STUDIES Abstract only
R. Jha *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

A quantitative model to estimate the degree of annealing of

nuclear tracks in mineral grains subjected to a variable temperature history was proposed. This model is applied to study the track annealing records in different meteorites resulting from their atmospheric heating. Scale lengths were measured of complete and partial track annealing, delta X sub 1 and delta X sub 2, respectively. In mineral grain close to fusion crust in about a dozen meteorites. Values of delta X sub 1 and delta X sub 2 depend on extent and duration of heating during atmospheric transit and hence on meteorite entry parameters. To estimate track annealing, the temperature history during atmospheric heating at different distances from the crusted surface of the meteorite is obtained by solving heat conduction equation in conjunction with meteorite entry model, and use of the annealing model to evaluate the degree of annealing of tracks. It is shown that the measured values of delta X sub 1 and delta X sub 2 in three of the meteorites studied are consistent with values using preatmospheric mass, entry velocity and entry angle of these meteorites. E.A.K.

N85-15608*# Geological Survey, Denver, Colo.
NEUTRON ACTIVATION ANALYSIS OF STONEY SPHERULES FROM A MARINE SEDIMENT SAMPLE Abstract only
H. T. Millar, Jr. and P. Englert (Koln Univ., West Germany) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The identification of extraterrestrial material in samples collected at the surface of the Earth is discussed. Criteria were established for black magnetic spherules which involve the presence of: Fe, Ni, and Co in iron meteoritic ratios, wustite, and Fe-Ni metal while reliable criteria for stoney spherules are not well established. Neutron activation analysis was performed on eight stony spherules separated from the same marine sediment used by Millard and Finkelman. The 22 elements were determined by Compton suppression and triple coincidence gamma counting. It is found that Fe, Mg, Al, Ni, Cr, Co, Ir, and Sc are the best discriminators between chondritic and terrestrial compositions. Three of the spherules have compositions very close to chondrites and of these, two contain 0.5 and 0.25 ppm Ir. The other five spherules contain much less than chondritic concentrations of Ni but this element may be segregated and lost during ablation of the parent meteorite. One of these five low Ni spherules contains 2.9 ppm Ir while the other four contain less than 0.05 ppm Ir. E.A.K.

N85-15609*# Chicago Univ., Ill.
OXYGEN ISOTOPES IN DEEP SEA SPHERULES Abstract only
Toshiko K. Mayeda, Robert N. Clayton, and Donald E. Brownlee (Washington Univ., Seattle) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The determination of the genetic relationships between the dust and small particles in the solar system, and the meteorites and larger bodies are examined. Oxygen isotopes proved useful in the identification of such relationships between one meteorite group and another. Of the various samples of submillimeter extraterrestrial particles available for laboratory study, only the deep sea spherules are abundant enough for precise oxygen isotope analysis using existing techniques. Complications arise in interpretation of the isotopic data, since these particles were melted during passage through the Earth's atmosphere, and have been in contact with seawater for prolonged periods. Spherules that were originally silicates are considered with the originally metallic ones to deduce their preterrestrial isotopic compositions. The type 1 spherules which enter the atmosphere as metallic particles, contain only atmospheric oxygen. The type S spherules contain a mixture of atmospheric oxygen and their original extraterrestrial oxygen. It is suggested that the Earth's mesosphere is strongly enriched in heavy isotopes of oxygen at altitudes near 90 km at which the iron particles are oxidized. Fractionation due to the combined diffusion of O atoms and O2 molecules may be responsible. E.A.K.

N85-15610*# Chicago Univ., Ill.
MINOR ELEMENTS IN RELICT OLIVINE GRAINS OF DEEP-SEA SPHERES: MATCH WITH Mg-RICH OLIVINES FROM C2 METEORITES Abstract only
J. V. Smith, I. M. Steele, and D. E. Brownlee (Washington Univ., Seattle) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The bulk composition and relict minerals of meteoroid ablation spheres from deep sea sediments can be related to the parental material, and bulk compositions and elemental ratios favor a CI/CM affinity for most spheres. Although largely melted, some deep sea spheres (DSS) have retained rare grains apparently unmodified chemically by ablation heating or seawater alteration. Minor elements in relict olivines for comparison with compositions of olivines in known meteorites were analyzed. All relict olivines are very Mg rich. No terrestrial olivines match the chemical features which reinforces other evidence for an extraterrestrial origin. There is no match with achondritic olivines. Mg rich olivines occur in all types of carbonaceous meteorites, but the minor elements of most DSS olivines do not match with those for Allende (C3) olivines, and fit poorly with those of Murchison (C2) olivines. There is a good fit for Fe and Cr with those of the olivines in the unusual Belgica 7904 (C2) meteorite (3). It seems likely that the relict olivines of at least many deep sea spheres are chemically related to olivines in at least one C2 meteorite. E.A.K.

N85-15611*# Washington Univ., Seattle. Dept. of Astronomy.
PLATINUM GROUP NUGGETS IN DEEP SEA SEDIMENTS Abstract only
D. E. Brownlee, B. A. Bates, and M. M. Wheelock *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The existence of iron meteor ablation spheres in deep sea sediments was known for over a century. These spheres generally were believed to be composed of either pure magnetite and wustite or an oxide shell surrounding a NiFe metal core. A large number of 300 micron to 600 micron spheres found were pure oxide spheres, usually containing a solitary < 10 micron platinum group nugget (pgn) composed almost entirely of group VIII metals. Twelve PGN's were analyzed and most had chondritic abundances with some depletions that correlate with element volatility. PGN formation by oxidation of a molten metal sphere entering the atmosphere cannot occur if the oxygen abundance in the atmosphere is less than half of its present value. The first appearance of PGN's in the geological record should mark when, in the Earth's history, oxygen rose to this level. B.G.

N85-15612*# Kyoto Univ. (Japan). Dept. of Physics.
PECULIAR SPHERULES FROM ANTARCTICA AND THEIR ORIGIN Abstract only
Yuji Tazawa and Yoshiyuki Fujii (National Inst. of Polar Research, Tokyo, Japan) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
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Two calcium titanium oxide spherules (CTS) and an iron chromium nickel oxide one (FCN) were obtained from a segment of ice core collected at Mizuho Station, East Antarctica. An anomalous REE abundance pattern enriched in Sm by a factor of about 10 relative to the typical pattern of terrestrial perovskites was found. Subsequently, more than forty spherules from ten other depth ranges of the ice core were analyzed: (1) both CTS and FCN occur in every depth range; (2) CTS, FCN, and other are in the ratio of about 2:21 among all the analyzed spherules; (3) all of CTS show the same chemical and mineralogical characteristics as those previously obtained; (4) CTS contains some amounts of Cr and Fe, and/or FCN contains Ca and Ti; and (5) two composite

particles exist among all the spherules. It is implied that CTS and FCN had originated in a common natural material and from a common natural process. B.G.

N85-15613*# California Univ., San Diego, La Jolla. Dept. of Chemistry.
FRACTIONATION OF SIDEROPHILES IN COSMIC SPHERULES AND ITS IMPLICATIONS Abstract only
J. Czajkowski and P. Englert (Koln Univ., West Germany) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A01/MF A01 CSCL 03B

Fractionation of siderophiles between metal and silicate phases at different oxygen fugacities was extensively studied. Such data could be applied to study the fractionation during formation of stony or iron spherules. However another kind of fractionation exists which takes place within the spherules as they are molten and oxidized in the Earth's atmosphere. During this process two phases develop, one oxidized, the other not. Unoxidized phase is the globule described by shape and high Fe and Ni contents. The process of atmospheric melting is dependent on many factors, one of which is the density of the atmosphere. The density profile of the atmosphere is assumed to have remained constant with time, whereas composition has not. Quantitative explanations of depletions or absence of siderophiles in spherules were initiated. B.G.

N85-15614*# Union Coll., Schenectady, N.Y. Dept. of Mechanical Engineering.
THE INFLUENCE OF GRAVITATIONAL BODY FORCE IN METEORITIC CHONDRULE AND LUNAR GLASS FORMATION Abstract only
P. Z. Budka *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The effects of gravitational body force must be considered in the formation of extraterrestrial materials such as meteoritic chondrules and lunar glasses. Solidification experiments conducted in microgravity as well as g values greater than Earth's gravitational force have demonstrated that gravitational force can have profound and sometimes unexpected effects upon the way materials solidify and, therefore, upon their ph sical and mechanical properties. Solutal, thermal and sedimen.ation effects differ from those experienced on Earth. Because buoyancy forces are reduced, materials of different densities may remain in close proximity. The spherical morphology of chondrules and many lunar glasses may reflect the tendency for free floating liquids to form spherical droplets in a microgravity environment, a form which minimizes surface energy. Under these conditions, surface energy forces dominate gravity forces. The formation of two common chondrule textures, barred and radiating chondrules, can be explained using observations from glass science. Author

N85-15615*# California Univ., Los Angeles. Inst. of Geophysics.
EVOLUTIONARY HISTORY OF CI AND CM CHONDRITES Abstract only
J. F. Kerridge and J. D. Macdougall (Scripps Institution of Oceanography, La Jolla, Calif.) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

It is now clear that several different processes have acted upon various components of carbonaceous chondrites, and that at least some of those processes occurred very early in solar system history. Because these meteorites are breccias, petrographic relationships are seldom informative about the order in which those processes took place. Nonetheless, information about such an evolutionary sequence would be of potential value in defining the nature of the source region for these meteorites. Implantation of solar wind derived noble gases into CI magnetite apparently postdated the period of aqueous activity believed to be responsible for magnetite production. Carbonate crystallization roughly coincided with one or more episodes of impact driven brecciation. B.G.

N85-15616*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HYDROTHERMAL ALTERATION OF CM CARBONACEOUS CHONDRITES: IMPLICATIONS OF THE IDENTIFICATION OF TOCHILINITE AS ONE TYPE OF METEORITIC PCP Abstract only
Michael E. Zolensky *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Poorly characterized phases (PCP's) constitute up to 30 volume percent of some CM carbonaceous chondrites, and are therefore an important key to an understanding of the physico-chemical conditions attending matrix evolution. An iron rich form of the terrestrial phase tochilinite was recently identified as a common type of PCP. Tochilinite has the general formula 6Fe(0.9)S.5(Mg,Fe)(OH)2 and consists of alternating machinawite (FeS) and brucite ((Mg,Fe)(OH)2) sheets, with iron vacancies in the sulfide sheets. In iron rich tochilinite, ferrous hydroxide, called amakinite, replaces brucite. If CM carbonaceous kchondrites have underdone hydrothermal alteration, iron rich tochilinite, at least, probably grew from aqueous solutions characterized by low FO2, high FS2, pH 10 to 12, and at a temperature at or below 170 C. Author

N85-15617*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AQUEOUS ALTERATION OF METEORITE PARENT BODIES: POSSIBLE ROLE OF UNFROZEN WATER AND THE ANTARCTIC METEORITE ANALOGY Abstract only
J. L. Gooding *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Based on oxygen isotrophy the alteration of CM2 chondrites could occur at or near O C (273 K). Such a scenario can be understood if C chondrite parent bodies evolved as rock/ice mixtures that contained unfrozen (mobile or quasi-liquid below 273K) pure water, a well known phenomenon in cold soils on Earth. The importance of unfrozen water diagenesis in C chondrite history can be tested by a combined program of experimental simulations and petrologic study of analogous features developed by weathering of meteorites in or an Antarctic ice. B.G.

N85-15618*# Arizona Univ., Tucson.
UNEXPLAINED Fe, NI AND S ANOMALIES IN CV CHONDRITE COMPONENTS Abstract only
D. A. Wark *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
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Large negative anomalies in Fe, Co, Ni, S and Se are present in Allende Type B Ca-Al-rich inclusions (CAI's). Based on compilations of all the known published analyses, Allende chondrules, aggregates and other types of CAI's also display anomalies. These observations show that: (1) since Fe, Co, Ni, S and Se are more depleted than elements bracketing them in volatility (such as Pt and Au, and Su and Cd), the anomalies were not produced during the volatility dependent, high temperature CAI forming processes; (2) since Pt, Au, Ge and other siderophiles are not as depleted as Fe, Co and Ni, the anomalies are not due to a metal/silicate fractionation; (3) the association of Fe, Co, and Ni anomalies with S and Se anomalies suggests that the anomalies are due to the removal of FeNi sulfide; and (4) since these anomalies occur in all types of Allende inclusions, aggregates and chondrules, the Allende parental material must have undergone sulfide loss before the formation of these components. B.G.

N85-15619*# Chicago Univ., Ill.
MINOR ELEMENTS AND CATHODOLUMINESCENCE OF Mg-RICH OLIVINES FROM MURCHISON AND ALLENDE CARBONACEOUS METEORITES Abstract only
I. M. Steele, C. M. Skirius, and J. V. Smith *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
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The morphology and inclusions of individual Mg rich olivine grains from C2 chondrites provide disputed evidence for origin either from a liquid or a vapor. Olivine grains from Murchison (C2) and Allende (C3) meteorites were examined to extend data on Belgica 7904 (C2. Cathodoluminescence revealed the relation of chemical zoning to external shape and inclusions. High precision electron probe analyses of selected spots for Na, Al, P, Ca, Ti, Cr and Mn provided chemical constraints on the source material. From several possible explanations tentative suggestions are for at least two stages: (1) growth of the blue core from a vapor enriched in refractory elements (hence lack of inclusions); and (2) growth of red/dark rim from an unenriched liquid which entrapped the blue core. Mechanical transfer may be involved. The channels and networks are puzzling at this time. Whatever the true explanation, a complex history is needed for a simple mineral, and further study should provide additional restraints on formation of carbonaceous meteorites. B.G.

N85-15620*# Tennessee Univ., Knoxville. Dept. of Geological Sciences.
STRAIN ANALYSIS OF THE LEOVILLE CHONDRITE AND CONDITIONS IN ASTEROIDAL INTERIORS Abstract only
Parham M. Cain and Harry Y. McSween, Jr. *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Deformed chondrules in the Leoville carbonaceous chondrite define a preferred orientation, also recognized previously in other CV3 chondrites. Identifying the strain mechanism is necessary for understanding the conditions which caused this compressional shortening. Luckily, the major mineralogical constituent of CV3 meteorites is olivine, for which experimental data on strain mechanisms exist. The conditions that caused strain in the olivine were obviously applicable to the whole meteorite. Possible mechanisms of olivine deformation are cataclasis, low temperature plasticity, power low creep, and diffusional flow, each of which occurs under different combinations of temperature and deviatoric stress. Cataclasis can be ruled out on the basis of its high deviatoric stress requirements; some fractures occur in chondrule olivines, but these may have formed during excavation or impact. Low temperature plasticity and power low creep occur by means of various types of lattice dislocations. However, methods of thermal decoration and chemical etching of dislocations failed to indicate evidence for either mechanism. Thus, the inference is that diffusional flow, characteristic of low to moderately high temperatures and low deviatoric stress, was the major deformation mechanism. B.G.

N85-15621*# California Univ., Los Angeles. Inst. of Geophysics.
THE COLONY METEORITE AND THE POSSIBLE EXISTENCE OF A NEW CHEMICAL SUBGROUP OF CO3 CHONDRITES Abstract only
A. E. Rubin, J. A. James (Arkansas Univ., Fayetteville), B. D. Keck (Arkansas Univ., Fayetteville), K. S. Weeks (Arkansas Univ., Fayetteville), and D. W. G. Sears (Arkansas Univ., Fayatteville) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The Colony meteorite, found in Oklahoma around 1975, has an unrecrystallized texture and contains heterogeneous olivine and low Ca pyroxene, kamacite with low Ni and Co and high Cr, amoeboid inclusions with low FeO and MnO, and numerous small chondrules with clear pink glass. These characteristics are shared by members of the least metamorphosed subgroup of CO3 chondrites. Colony contains a fine grained matrix that has higher FeO and K2O and lower MgO and Na2O than normal CO3 matrices. Allan Hills A77307 is another unmetamorphosed meteorite that has many petrologic similarities to normal CO chondrites, including matrix abundance, mineral compositions and chondrule size. However, it differs from them in its abundance of magnetite and presence of iron carbides. The olivine and low Ca pyroxene compositional distributions of Colony and A77307 are very similar. The shapes of the thermoluminescence glow curves of Colony and A77307 are very similar, but differ significantly from those of normal CO chondrites. It is suggested that Colony and A77307 represent a distinct chemical subgroup of CO3 chondrites, characterized by low Ni, Co, S, Ca, Mg, Mn and, possibly, high Cd. M.G.

N85-15622*# Rice Univ., Houston, Tex. Dept. of Geology.
X-RADIOGRAPHY OF SLICES OF THE ALLENDE METEORITE Abstract only
M. J. Smith, J. B. Anderson, and D. Heymann *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
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A 2.2 kg fragment of the Allende Meteorite was derinded and sliced by bandsawing. Several X-radiographs were made of all slices. The following features are resolved: grains of blocky troilite (bright spots), troilite rimmed chondrules (bright halos), chondrules with central vugs (dim halos), white aggregates (dark patches), and dark inclusions (medium dark patches). The number of FeS grains larger than about 0.5 mm is one per 6 + or - 1 gram of this fragment. Their concentration appears to be uniform at the 1 kg weight level, but is not uniform at the 100 g level. The number of FeS rimmed chondrules is one per 10 g. Their concentration is also nonuniform at the 100 g weight level. The number of white aggregates is roughly one per 20 g. These disc shaped objects show a distinct preferred orientation of the axis orthogonal to the plane of the disc. Chondrules with central vugs are numerous. Linear and curved arrays of chondrules, up to a few cm long, were observed. An interpretation of the observed features is given. Author

N85-15623*# Lehigh Univ., Bethlehem, Pa. Dept. of Metallurgy and Materials Engineering.
A STUDY OF TETRATAENITE Abstract only
K. B. Reuter, J. I. Goldstein, D. R. Williams, and E. P. Butler (Imperial Coll. of Science and Technology, London, England) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
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The tetrataenite in Dayton was examined using conventional transmission (TEM) and analytical electron microscopy (AEM). Tetrataenite was also simulated in terrestrial Fe-Ni alloys through electron irradiation of thin-foil specimens on the high voltage electron microscope (HVEM). The purpose was to correlate the results of the TEM, AEM and HVEM studies on Dayton and on terrestrial iron-nickel alloys to the low temperature iron-nickel phase diagram. Oxide forms spontaneously on the surfaces of thin-foil iron-nickel specimens. By determining the metal/oxide orientation relationships the reflections due to the oxide and the superlattice are distinguished. In Dayaton, the clear taenite (I) is fully ordered until near the cloudy zone interface. The ordered domains ranged in size from 30 to 650 nm with the largest domains corresponding to the highest Ni content and the smallest domain size corresponding to the lowest Ni content. In terrestrial alloys irradiated on the HVEM, the extent of electron irradiation induced ordering was determined as a function of temperature and composition. Ordering occurred in every specimen irradiated. Author

N85-15624*# Niels Bohr Inst., Copenhagen (Denmark).
MOSSBAUER SPECTROSCOPY AND X-RAY DIFFRACTION OF SAMPLES FROM THE SANTA CATHARINA IRON METEORITE Abstract only

H. Roy-Poulsen, R. S. Clarke, Jr. (Smithsonian Institution, Washington, D.C.), G. B. Jensen (Technical Univ. of Denmark, Lyngby), J. M. Knudsen, L. Larsen, N. O. Roy-Poulsen, and L. Vistisen *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
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Conversion electron Mossbauer spectroscopy (CEMS) of samples from the Santa Catharina iron meteorite shows the presence of the ordered iron-nickel phase with 50% Ni, tetrataenite, and of the paramagnetic iron-nickel phase with 25% Ni. The FeNi phase with 50% Ni amounts to 70% of the iron-nickel alloys. Futhermore, the CEM spectra show the presence of small peaks from one or more spinel compounds. These small peaks are more pronounced when regions near the rim of the samples are analyzed. The X-ray diffraction of different areas of the samples, both optically dark and optically light areas, shows the presence of a diffraction pattern from a single f.c.c. lattice with a lattice parameter of a=3.58A This means that the two different Fe-Ni phases seen in the CEMS analysis occupy the same lattice. The X-ray photographs also show the presence of super-structure reflections from the ordered FeNi phase, and that the orientation of the f.c.c. lattice is the same within the whole sample. Author

N85-15625*# National Museum of Natural History, Washington, D. C.
STRUCTURAL DEVELOPMENT IN THE SANTA CATHARINA METEORITE Abstract only
Roy S. Clarke, Jr. *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
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A metallographic study was undertaken to seek support for the idea that Santa Catharina is really massive cloudy taenite. Available metal-rich nuggets of Santa Catharina appear to have been single crystals of taenite in the few centimeter size range, separated from each other by grain boundaries occupied by troilite and schreibersite. Metallographic and electron microprobe data allow one to postulate the following cooling and structural development history: (1) single crystal taenite formed at high temperature; (2) phosphate formed within the taenite and grain boundary schreibersite formed at interfaces with troilite or with other taenite crystals; (3) schreibersite began to precipitate within taenite at about 650 C; (4) at about 450 C the meteorite entered the three phase field at which point kamacite precipitated and started growing; and (5) kamacite/schreibersite interface measurements indicate that cooling continued down to about 350 C, with large Ni diffusion gradients developing within schreibersites.
Author

N85-15626*# Lehigh Univ., Bethlehem, Pa. Dept. of Metallurgy and Materials Engineering.
LOW TEMPERATURE DIFFUSION COEFFICIENTS IN THE Fe-Ni AND FeNiP SYSTEMS: APPLICATION TO METEORITE COOLING RATES Abstract only
D. C. Dean and J. I. Goldstein *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01

The interdiffusion coefficient of FeNi in fcc taenite (gamma) of Fe-Ni and Fe-Ni-0.2 P alloys was measured as a function of temperature between 600 and 900 C. This temperature range is directly applicable to the nucleation and growth of the Widmanstatten pattern in iron meteorites and metal regions of stony and stony-iron meteorites. Diffusion couples were made from FeNi or FeNiP alloys which ensured that the couples were in the taenite phase at the diffusion temperature. The presence or absence of grain boundary diffusion was determined by measuring the Ni profile normal to the existing grain boundaries with the AEM. Ignoring any variation of interdiffusion coefficient with composition, the measured data was plotted versus the reciprocal of the diffusion temperature. The FeNi data generally follow the extrapolated Goldstein, et al. (1965) data from high temperatures. The FeNiP data indicates that small additions of P (0.2 wt%) cause a 3 to 10 fold increase in the FeNi interdifussion coefficient increasing with decreasing temperature. This increase is about the same as that predicted by Narayan and Goldstein (1983) at the Widmanstatten growth temperature. Author

N85-15627*# Arizona Univ., Tucson. Lunar and Planetary Lab.
EXTREME INCOMPATIBILITY OF Pb DURING THE CRYSTALLIZATION OF MAGMATIC IRON METEORITES Abstract only
J. H. Jones and S. R. Hart (MIT, Cambridge) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The partitioning behavior of Pb in the three-phase system metal-troilite-sulfide liquid was investigated. Microscopic examination and electron microprobe analysis of a polished section showed three phases--Fe metal, troilite and an Fe-S-Pb-O metallic liquid. The Pb concentration of the metallic liquid was 1.4 wt.%; the Pb contents of both the troilite and the Fe metal were below the detection limit of the electron probe. To better define the Pb concentrations of the solid phases, the same sample was analyzed for Pb and Fe using the M.I.T., Harvard and Brown ion microprobe. Even at this level of precision, some conclusions and speculations are possible: (1) The D(Pb) (troilite/metallic liquid) is low (.01 to .001) and, contrary to expectation, troilite, like metal, excludes Pb very effectively during the crystallization of metallic liquids; (2) Pb in iron meteorites is conceivably concentrated in trace phases which are less susceptible to contamination than metal and troilite; and (3) taken at face value D(Pb)(metal/troilite) is 0.1, but given the Pb and Fe ion yields from simple endmember phases (Fe, FeS, Pb, PbS), this D is more likely to be 0.05 to 0.03. Author

N85-15628*# Lehigh Univ., Bethlehem, Pa. Dept. of Metallurgy and Materials Engineering.
EXPERIMENTAL AND THEORETICAL STUDY OF THE FORMATION OF THE 2AB, 3AB, AND 9A METEORITE CHEMICAL GROUPS FROM THE PARENT LIQUID Abstract only
R. Sellamuthu and J. I. Goldstein *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Segregation of solute elements was measured in plane front solidified Fe-Ni-S-P alloys of meteoritic composition containing Ir, Ge and/or Cu. The Ni and P contents reach maximum values of 10.5 wt% and 1.1 wt%, respectively, in austenite (taenite) at the end of primary solidification. Distribution coefficients of Ni, P, Ir, Ge and Cu were determined from the solidified alloys. The distribution coefficients vary with the S and P content of the liquid. In addition the distribution coefficients of Ni, P, Ir and Ge increase and the distribution coefficient of Cu decreases with the S to P ratio. Equations that describe the concentration dependence of the distribution coefficients were developed and used to calculate solute redistribution during the solidification of IIAB, IIIAB and IVA parent bodies. The calculated P vs Ni, Ir vs Ni and Ge vs Ni trends are in good agreement with the observed meteoritic data. Since the calculated value of the maximum solid solubility of P agrees well with the observed maximum P composition data for IIAB and IIIAB irons, it is concluded that complete crystallization of the parent liquids of IIAB and IIIAB had occurred before any fragmentation of the solidified body. Author

N85-15629*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INVESTIGATIONS CONCERNING THE MAGMATIC IRON METEORITES: STATIC VS. DYNAMIC EXPERIMENTS Abstract only
Daniel J. Malvin, John H. Jones, and Michael J. Drake *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Experimental problems associated with metallic solid/metallic liquid partitioning investigations are evaluated. Of particular concern is the discrepancy of partition coefficient results obtained from experiments which were static (constant temperature for the

duration of the experiment) and those which were dynamic (where an experimental charge is slowly drawn from the furnace). M.G.

N85-15630*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
METEORITIC CONSTRAINTS ON PROCESSES IN THE SOLAR NEBULA Abstract only
John A. Wood *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

High-temperature events or processes in the solar nebula were required to form the chondrules and CAI's that make up the bulk of the substance of most chondrites. There is no consensus in the meteoritical community as to the nature of these high-temperature events or processes. In spite of this major area of uncertainty several conclusions can be reached about properties of the nebula. The chondrules and CAI's were formed in regions where the dust/gas ratio was orders of magnitude above the cosmic value. After these high-temperature objects were formed, they began to accrete very promptly (a time scale of hours, probably). Formation and aggregation of the chondrite components happened at the same radial distance in the nebula where chondrites reside today (the asteroid belt). The ambient temperature of the nebula at that time and place was relatively low (< 700 K), and was not responsible for the thermal processing of the chondrules and CAI's. R.S.F.

N85-15631*# Arizona State Univ., Tempe.
CHEMICAL EVOLUTION OF THE SOLAR NEBULA: A NEW MODEL Abstract only c92
B. M. P. Trivedi *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
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The common notion of a hot solar nebula from which meteoritic minerals condensed is not supported by theories of star formation. A model is developed which can give the same sequence of condensation without recourse to hot solar nebula. In this model, the solar nebula was formed from the matter ejected by the Sun during its T Tauri phase and the chemical condensation took place in this outflowing matter. Isotopic anomalies and the unique minerals found in meteorites may be explained by this model. R.S.F.

N85-15632*# Los Alamos Scientific Lab., N. Mex.
HOMOGENEOUS CONDENSATION OF GASEOUS MIXTURES OF Si, Fe, O, N, AND C IN RELATIVE COSMIC ABUNDANCE AND IMPLICATIONS FOR ASTRONOMICAL CONDENSATION Abstract only c90
J. R. Stephens *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
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The pressure versus temperature curves for homogeneous nucleation and condensation of two gaseous mixtures with nearly relative solar abundance of Si, Fe, O, N, and C in an excess of H were determined experimentally. Mixtures of CO, Fe(CO)5, H2, SiH4, and N2O in Ar were heated behind reflected shocks in a shock tube. The nucleation and condensation, which took place in the subsequent gas-dynamic expansion (cooling phase), was monitored by light scattering and turbidity. Grain morphologies and crystalline phases present in the condensates were determined by electron microscopy. These data cast doubt on the validity of both equilibrium and classical nucleation theoretical approaches to predict homogeneous condensation in a solar nebula or stellar atmosphere. R.S.F.

N85-15633*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DYNAMIC THERMAL EPISODES IN THE PROTOSOLAR NEBULA: DEVELOPMENT OF MODELS FROM OBSERVATIONS ON CAI'S Abstract only c92
T. E. Bunch, S. Chang, P. Cassen, and D. Hollenbach *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Evaluation of earlier observations indicated that layered rims on coarse-grained Allende CAI's were possibly the result of partial melting by ablation/drag-heating and reaction of CAI exteriors with a gas or gases of non-solar composition. Bunch and Chang reported the common occurrence of thin, fine-grained, matrix-like bands that at least partially surround rims of CAI's. Although material in these bands in general appears to be similar to matrix, SEM observations show them to be dissimilar in volatile element content, mineral composition, and grain morphology. Moreover, they appear to be related in time of formation with rim development and Na-metasomatism of CAI's. Observations indicate a short-lived but intense heating episode followed by radid cooling as the mechanism responsible for these CAI features. R.S.F.

N85-15634*# Commissariat a l'Energie Atomique, Bordeaux (France).
ON THE RECORD OF GALACTIC COSMIC RAY FLUX AND TRAFFIC BREAK-UPS IN IRON METEORITES Abstract only c93
S. Regnier, B. Lavielle (California Univ., San Deigo, La Jolla), K. Marti (California Univ., San Deigo, La Jolla), and G. N. Simonoff *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Iron meteorites contain the record of the galactic cosmic ray intensity over a 100 to 1000 Myr time scale. A method was developed to calculate the cosmic ray exposure ages of iron meteorites. Discrepanices between exposure ages are discussed. R.S.F.

N85-15635*# California Univ., La Jolla.
THE LOW-ENERGY SECONDARY COSMIC RAY FLUX: DETECTORS IN IRON METEORITES Abstract only c93
S. V. S. Murty and K. Marti *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-88)
Avail: NTIS HC A10/MF A01 CSCL 03B

The cosmic ray-produced nuclides in the interiors of very large bodies are mainly due to secondary particle reactions. The records of low-energy products, specifically the neutron capture products in meteorites, may provide new information regarding multi-stage irradiation and parent body break-ups. Noble gas nuclides, in general, are the best candidates for these investigations. The troilite nodules of iron meteorites contain very low amounts of trapped gas and, because of their elemental abundance systematics of suitable target elements for low energy production of noble gas nuclides, they are ideal candidates for this purposes. Results of a study of noble gases and nitrogen in a troilite nodule of the Cape York iron are presented. R.S.F.

N85-15636*# Physical Research Lab., Ahmedabad (India).
SOLAR COSMIC RAY PRODUCED NEON IN LUNAR SOILS AND THEIR IMPLICATION FOR GAS-RICH METEORITE STUDIES Abstract only c93
C. M. Nautiyal and M. N. Rao *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Characteristic neon isotopic ratios, produced due to solar cosmic ray spallation (SCR) in lunar soils, are useful in deciphering and estimating the relative contributions of SCR and GCR spallation. To delineate these features, etched mineral grains from mature and immature lunar soils (14148 and 61221 respectively) were analyzed using mass spectrometry. The SF-Ne composition deduced in this work agrees with that obtained from earlier etched lunar pyroxene studies. The data points for mature soil 14148 define a line which significantly deviates from the 61221 tie line. This deviation is attributed to the presence of SCR spallation

component. In this context, neon isotopic compositions (step-wise heating) in Pantar and Leighton dark portions were studied and compared with that of Fayetteville. The meteorite data points deviate significantly from the tie line joining SF-Ne and GCR (pyroxene) end points. This deviation is attributed to SCR-spallation in gas-rich chondrites. R.S.F.

N85-15637*# Paris XI Univ., Orsay (France).
SOLAR WIND AND COSMIC RAY IRRADIATION OF GRAINS AND ICES - APPLICATION TO EROSION AND SYNTHESIS OF ORGANIC COMPOUNDS IN THE SOLAR SYSTEM Abstract only **c92**
F. Rocard, J. Benit, J. P. Meunier, R. Bibring, and B. Vassent *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Solar wind and cosmic and cosmic ray irradiation of grains induces physical and chemical effects including their erosion and the synthesis of molecular compounds within the implanted layers. The experiments performed with H2O ice implanted by keV ions are presented. The ion implantation is intended to simulate the irradiation of comets, ring grains, and satellites of outer planets, either by the primitive solar particles or by contemporary solar wind (SW) or solar cosmic rays (SCR) fluxes. The detection of molecules was obtained through in-situ infrared spectroscopy. A model is proposed for the formation of organic matter within icy solar system bodies which is in agreement with experimental results of erosion rates. The organic molecules, frozen-in within the icy mantles of the grains present in the protosolar nebula, would originate from their primitive irradiation. Such an irradiation would have taken place during an early stage of the proto-sun, when both the SW and SCR particles were more intense by orders of magnitude. R.S.F.

N85-15638*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
GRAINSIZE EVOLUTION AND DIFFERENTIAL COMMINUTION IN AN EXPERIMENTAL REGOLITH Abstract only
F. Horz, M. Cintala, and T. See (Lockheed Engineering and Management Services Co., Houston, Tex.) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The comminution of planetary surfaces by exposure to continuous meteorite bombardment was simulated by impacting the same fragmental gabbro target 200 times. The role of comminution and in situ gardening of planetary regoliths was addressed. Mean grain size continuously decreased with increasing shot number. Initially it decreased linearly with accumulated energy, but at some stage comminution efficiency started to decrease gradually. Point counting techniques, aided by the electron microprobe for mineral identification, were performed on a number of comminution products. Bulk chemical analyses of specific grain size fractions were also carried out. The finest sizes (< 10 microns) display generally the strongest enrichment/depletion factors. Similar, if not exactly identical, trends are reported from lunar soils. It is, therefore, not necessarily correct to explain the chemical characteristics of various grain sizes via different admixtures of materials from distant source terrains. Differential comminution of local source rocks may be the dominating factor. R.S.F.

N85-15639*# Hawaii Univ., Honolulu. Inst. of Geophysics.
SPECTRAL REFLECTANCE STUDIES ON THE ORIENTALE REGION OF THE MOON Abstract only
B. R. Hawke, P. Lucey, J. F. Bell, and P. D. Spudis (Arizona State Univ., Tempe) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The Orientale impact occurred in rugged highlands on the southwestern limb of the Moon and was the last of the major basin-forming events. Valuable insight concerning lateral and vertical changes in the composition of the lunar crust can be provided by studies of material exposed by lunar impact basins. These impacts have excavated material from a variety of depths and deposited this ejecta in a systematic manner. In order to investigate the composition of materials exposed on the interior of Orientale basin, near-infrared reflectance spectra were collected for units within the Cordillera ring. R.S.F.

N85-15640*# Brown Univ., Providence, R. I.
ASTEROID-METEORITE CONNECTION: REGOLITH EFFECTS IMPLIED BY LUNAR REFLECTANCE SPECTRA Abstract only
C. M. Pieters *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The effect of soil formation on the spectral characteristics of asteroids were estimated in situ properties of materials affected by the space environment other than those associated with agglutinates. In his initial survey of the reflectance properties of lunar samples, J.B. Adams measured a few chips from the exterior and interior of Apollo rocks. For Apollo 12 basalts [12053-12063], the exterior and interior spectra exhibited strong absorption bands which were very similar in nature; the exterior fragment was a bit brighter, which was attributed to microbrecciation. Mature lunar soils measured undisturbed surface areas at the landing sites. It was hypothesized that freshly exposed material at fresh impact craters should be comparable to powdered rock samples in the laboratory. This expected trend seemed to be true with the early reflectance data, but as the more complete near-infrared data has become available it is clear that there is no simple correspondence of rock type (laboratory powder or chip measurement) to freshly exposed surface material (telescopic measurements of fresh crater classes). B.W.

N85-15641*# Chicago Univ., Ill.
WHERE IS THE EARTH'S MISSING XENON? Abstract only **c46**
John F. Wacker and Edward Anders *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 08G

Highly volatile elements (e.g., T1, Pb, B, C1, Br, etc.) in the Earth's crust occur in C-chondrite proportions, and so do the atmospheric noble gases Ne, Ar, and Kr. This has led to the suggestion that the Earth acquired its volatiles from a late veneer of C-chondrite-like material. A glaring exception is Xe, which is depleted approx. 20x relative to Ne, Ar, Kr. Three explanations are discussed for the depletion: (1) Xe is preferentially trapped in the crust, either in sediments (3) or in Antarctic ice (4); (2) the Earth's noble gas inventory is non-chondritic (5); or (3) Xe is incompletely outgassed from the mantle. B.W.

N85-15642*# Los Alamos Scientific Lab., N. Mex.
BORON COSMOCHEMISTRY Abstract only
David B. Curtis and Ernest S. Gladney *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The assumption that boron is a moderately volatile element is examined. It was demonstrated that interior pieces of chondrites contain significantly less boron than had been thought to be indigenous to this type of meteorite. The mean and range of boron abundances in 16 internal pieces of 10 chondrites were significantly smaller than in 126 pieces of 40 chondrites with unknown terrestrial histories. A new value of the cosmic abundance of boron was determined using the geometric average of the results from interior pieces of 10 chondrites. Based upon the thermodynamic assessment of the cosmochemical properties of boron by Cameron, et al. Anders and Ebihara assumed that boron was a moderately volatile element. They renormalized the data of Curtis et al. to a chondrule free basis and thus inferred that the cosmic abundance of boron was about 3 times greater than that proposed by Curtis, et al. To resolve these differences in data, the relative abundances

of several elements including boron were measured in 38 carefully prepared interior pieces of 26 different chondrites. Correlation between boron and sulfur abundances, indicate that, contrary to the conclusions of Cameron, et al., boron is not a moderately volatile element. B.W.

N85-15643*# Arizona State Univ., Tempe. Dept. of Geology.
THE CHEMISTRY OF RARE EARTH ELEMENTS IN THE SOLAR NEBULA Abstract only
J. W. Larimer, H. A. Bartholomay, and B. Fegley (MIT, Cambridge) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The high concentration of rare earth elements (REE) in primitive CaS suggests that the REE along with the other normally lithophile elements form stable sulfides under the unusual conditions which existed during the formation of enstatite chrondites. In order to acquire a more quantitative framework in which to interpret these data, the behavior of the REE in systems with solar, or slightly fractionated solar, composition is being studied. These new data introduce modest changes in the behavior of some of the REE when compared to previous studies. For example, the largest differences are in the stabilities of the gaseous monoxides of Ce, Eu, Tb, Ho, and Tm, all of which now appear to be less stable than previously thought, and YbO(g) which is somewhat more stable. Much more significant are the changes in REE distribution in the gas phase in fractionated systems, especially those made more reducing by changing the C/O ratio from the solar value of 0.6 to about 1.0. In almost all cases, the exceptions being Eu, Tm and Yb whose elemental gaseous species dominate, the monosulfides become more abundant. Moreover, the solid oxides of Eu, Tm and Yb become less stable under more reducing conditions which, in effect, should reduce the condensation temperature of all REE in more reduced systems. B.W.

N85-15644*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METEORITE CONCENTRATIONS IN ANTARCTICA: HOW COMPLETE IS THE PICTURE? Abstract only
J. O. Annexstad *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

The importance of ice sheet flow as part of the process of concentrating meteorites in Antarctica is discussed. Ford and Tabor were the first to surmise that some type of ice sheet transport of Antarctic meteorites was likely considering that the Thiel Mountains pallasite was found on glacier ice without evidence of impact. It was found that meteorites were carried by the ice to regions of high ablation where they were periodically uncovered. Three models of concentration have been proposed to explain the phenomena of meteorite accumulations on blue ice fields. Model 1, is a general picture relating meteorite fall and accumulation to the entire Antarctic continent. Model 2 is based upon the petrographic examination of an 8m ice core from the Allan Hills icefield and suggests a local origin of ice from the catchment basin. The third model is presented by Whillans and Cassidy who infer, by using conventional ice flow concepts, a path length as long as 1,000km from the sites of fall to recovery for Allan Hills specimens. Despite achievement of these working hypotheses, a number of questions must be resolved before a comprehensive model can be presented. B.W.

N85-15645*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SEARCHING FOR IMPACT CRATERS USING SPACE SHUTTLE PHOTOGRAPHY Abstract only c43
C. A. Wood, C. Dailey (Lockheed Engineering and Management Services Co., Houston, Tex.), W. Daley (Lockheed Engineering and Management Services Co., Houston, Tex.), and G. Wells (Lockheed Engineering and Management Services Co., Houston, Tex.) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p ref (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 08E

Extrapolation of impact cratering rates derived from Canada and Europe suggests that in the cratonic regions of Australia, India, Africa, and Brazil, 14-15 impact craters < 20 km diameter should have formed during the last 120 my, and survived erosional erasure. In fact, in these areas, only 2 craters are known that approximately qualify: (1) Gosses Bluff, 22 km, 130 + or - 6 my old, and; Strangways, 24 km and 150 + or - 70 my old. It is therefore likely that about a dozen relatively large and preserved impact craters await discovery in these less explored cratons. A larger number of younger and smaller craters must also exist. An informal search is reported for impact craters using photographs obtained by Shuttle astronauts. Photographs taken with the 250 mm lens on Hassalblad cameras have a resolution of < 25 m and cover a nominal area of 50x60 sq km. A larger format Linhof camera with similar resolution but 4 times larger area was flown March 1984, and will fly again in the future. Shuttle imagery has numerous advantages in looking for impact craters and for other types of Earth observations. B.W.

N85-15646*# Washington Univ., Seattle. Dept. of Astronomy.
SAMPLE RETURN FROM A COMET FLYBY Abstract only
D. E. Brownlee *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Sample collection and return to the Earth from a fast fly through of a cometary coma is the simplest sample return mission possible from any extraterrestrial body. The mission can provide valuable laboratory samples from a known cometary body and it can do it at low cost, within our lifetimes. The method and the merits of the sample collection process from a comet flyby are discussed. B.W.

N85-15647*# McCrone (Walter C.) Associates, Inc., Chicago, Ill.
DISCOVERY OF NUCLEAR TRACKS IN INTERPLANETARY DUST Abstract only c90
John P. Bradley and Donald E. Brownlee (Washington Univ., Seattle) *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

Prior to capture by the Earth's atmosphere individual interplanetary dust particles (IDP's) have allegedly spent up to 10 to the 5th power years as discrete bodies within the interplanetary medium. Observation of tracks in IDP's in the form of solar flare tracks would provide hitherto unknown data about micrometeorites such as: (1) whether an IDP existed in space as an individual particle or as part of a larger meteroid; (2) the degree to which a particle was heated during the trauma of atmospheric entry; (3) residence time of an IDP within the interplanetary medium; and (4) possible hints as to the pre-accretional exposure of component mineral grains to solar or galactic irradiation. Using transmission electron microscopy tracks in several micrometeorites have been successfully identified. All of the studied particles had been retrieved from the stratosphere by U-2 aircraft. Three pristine IDP's (between 5 and 15 micro m diameter) have so far been searched for solar flare tracks, and they have been found in the two smaller particles U2-20B11 (11 micro m) and U2-20B37 (8 micro m). B.W.

N85-15648*# Union Coll., Schenectady, N.Y. Dept. of Mechanical Engineering.
SPECULATIONS ON THE FORMATION OF METALLIC METEORITE PHASES Abstract only
P. Z. Budka and F. F. Milillo *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

A new interpretation of the formation of metallic phases in pallasites and nickel-iron meteorites can be made using a

non-equilibrium microgravity solidification hypothesis. This hypothesis implies that meteorites were initially large, weightless melts which solidified by radiative cooling. Current theories do not satisfactorily explain the coexistence of equilibrium and metastable phases. The proposed hypothesis accounts for the composition, morphology and coexistence of kamacite, plessite and pearlite within these same meteorites. B.W.

N85-15649*# California Univ., Los Angeles.
DIFFERENTIATED METEORITES AND THE COMPONENTS OF CHONDRITES Final Technical Report
John T. Wasson 31 Aug. 1984 7 p refs
(Grant NGR-005-007-329)
(NASA-CR-174201; NAS 1.26:174201) Avail: NTIS HC A02/MF A01 CSCL 03B

Findings are summarized from research conducted to develop a detailed classification of all kinds of meteorites in an effort to determine the conditions in the solar nebula, the processes that produced chemical fractionations in chondrites and formed chondrules, as well as ascertain the processes that occurred in the parent bodies of differentiated meteorites (which preserve a partial record of the chondritic materials from which they formed). Fractionation patterns within iron meteorite groups are analyzed. A.R.H.

N85-15650*# Lincoln Lab., Mass. Inst. of Tech., Lexington.
HOW MANY EARTH-APPROACHING ASTEROIDS ARE THERE? Semiannual Status Report
L. G. Taff [1985] 10 p refs
(Grant NAGw-232)
(NASA-CR-174209; NAS 1.26:174209; SASR-7) Avail: NTIS HC A02/MF A01 CSCL 03B

The discovery process of Earth-approaching asteroids is formulated as a periodic sampling problem from an urn with replacement. It presumes as unchanging number of such objects over recent historical times, a fixed limiting magnitude/angular speed combination for detection probability, and allows for the possibility of the lack of detection or the lack of sufficient observations to refine an orbit at the first noticed apparition. While simple, the model is sufficiently powerful to show that an estimate of the number of Earth-approaching minor planets is impossible. This conclusion is insensitive to uncertainties in perturbing influences, celestial mechanics, or a model for the distribution of the orbital element sets of these minor planets. Author

N85-15651# Battelle Columbus Labs., Ohio.
LARGE-EDDY SIMULATION. GUIDELINES FOR ITS APPLICATION TO PLANETARY BOUNDARY LAYER RESEARCH Final Report, Oct. 1983 - Aug. 1984
J. C. Wyngaard, W. D. Bach, Jr., S. Burk, W. R. Cotton, and J. H. Ferziger Aug. 1984 145 p Prepared in cooperation with Michaels Communications, Boulder, CO.
(Contract DAAG29-81-D-0100)
(AD-A146381; MC-84101-GS-Z) Avail: NTIS HC A07/MF A01 CSCL 04/1

After a review of the current status of turbulence and diffusion modeling in the planetary boundary layer (PBL) and engineering fluid mechanics, the Working Group on Large Eddy Simulation (LES) concluded that inherent uncertainty is a major complication to atmospheric experiments and modeling and that data bases for future models of PBL are unlikely to be derived from field experiments. The roles of LES in quantifying inherent uncertainty and in providing appropriate data bases for analysis are discussed. Long range guidelines for PBL research using LES are presented (1) for the technical components of a program--turbulence theory, computational problems and requirements, physical and numerical experiments and transfer of technology to less complex models--and (2) for the management program to simulate research in environmental fluid mechanics. Author (GRA)

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N85-15652*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SOLAR He-3-RICH EVENTS AND NON-RELATIVISTIC ELECTRON EVENTS: A NEW ASSOCIATION
D. V. Reames, T. T. vonRosenvinge, and R. P. Lin (California Univ., Berkeley) Nov. 1984 27 p refs Submitted for publication (Grant NAG5-376)
(NASA-TM86179; NAS 1.15:86179) Avail: NTIS HC A03/MF A01 CSCL 03B

In 15 months of observation by the ISEE-e spacecraft, it was found that virtually all solar greater than or approximately equal to 1.3 MeV/nucleon He-3-rich events are associated with impulsive 2 to approximately 100 keV electron events, although many electron events were not accompanied by detectable He-3 increases. Both the He-3 and the electrons exhibit nearly scatter-free propagation in the interplanetary medium, and the times of onset and maximum for the He-3 and electron increases are closely related by velocity dispertion. The electron events and their related type III solar radio bursts provide, for the first time, identification of the flares which produce He-3-rich events. He-3 appears to be accelerated at the flash phase of solar flares along with nonrelativistic electrons. Author

N85-15653# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 478, JUNE 1984. PART 1 (PROMPT REPORTS): DATA FOR MAY 1984, APR. 1984, AND LATE DATA
Jun. 1984 132 p 2 Vol.
(PB84-243153; NOAA-84081004; LC-79-640375) Avail: NTIS HC A07/MF A01 CSCL 03B

Contents: detailed index for 1983/1984; data for May 1984--IUWDS alert periods (advanced and worldwide), solar activity indices, solar flares, solar radio emission, inferred interplanetary magnetic field polarity, mean solar magnetic field and, boulder geomagnetic substorm log); data for April 1984--(solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurement by neutron monitor geomagnetic indices, and radio propagation indices) and late data--(Pioneer XII interplanetary magnetic field magnitudes, geomagnetic indices). GRA

N85-15654# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 478, JUNE 1984. PART 2 (COMPREHENSIVE REPORTS): DATA FOR DECEMBER 1983 AND MISCELLANEA
Jun. 1984 44 p 2 Vol.
(PB84-243161; NOAA-84081005; LC-79-640375) Avail: NTIS HC A03/MF A01 CSCL 03B

Contents: detailed index for 1983/1984; data for December 1983--(solar radio bursts at fixed frequencies, solar X-ray radiation from GOES satellite, and mass ejections from the Sun); and miscellaneous data--(Active regions Meudon 21 Sep 1983 to 8 Jan 1984, Synoptic solar maps 21 Sep 1983 to 8 Jan 1984, Interplanetary solar particles and plasma--IMP 8 data for Jan to Mar 1983). GRA

N85-15227# Joint Publications Research Service, Arlington, Va.
SOLAR WIND DYNAMICS AT SMALL DISTANCES FROM THE SUN Abstract Only
N. A. Lotova and D. F. Blums *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 135 Transl. into ENGLISH from Geomagetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 182-186 Original language document was announced in IAA as A84-31952 (For primary document see N85-15196 06-42) Copyright. Avail: NTIS HC A08

N85-15233# Joint Publications Research Service, Arlington, Va.
REPULSIVE FORCE OF MAGNETIC CLOUDS DURING SOLAR

FLARES AND MAGNETOSPHERIC SUBSTORMS Abstract Only
K. G. Ivanov and A. F. Kharshiladze *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 139 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 177-181 Original language document was announced in IAA as A84-31951 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15631*# Arizona State Univ., Tempe.
CHEMICAL EVOLUTION OF THE SOLAR NEBULA: A NEW MODEL Abstract only
B. M. P. Trivedi *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

N85-15633*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DYNAMIC THERMAL EPISODES IN THE PROTOSOLAR NEBULA: DEVELOPMENT OF MODELS FROM OBSERVATIONS ON CAI'S Abstract only
T. E. Bunch, S. Chang, P. Cassen, and D. Hollenbach *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

N85-15637*# Paris XI Univ., Orsay (France).
SOLAR WIND AND COSMIC RAY IRRADIATION OF GRAINS AND ICES - APPLICATION TO EROSION AND SYNTHESIS OF ORGANIC COMPOUNDS IN THE SOLAR SYSTEM Abstract only
F. Rocard, J. Benit, J.-P.04Meunier Bibring, R., and B. Vassent *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N85-15655*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSMIC RAY EXPOSURE AND LINEAR-ENERGY-TRANSFER EVALUATIONS FOR THE COBE MISSION
E. G. Stassinopoulos and J. M. Barth Nov. 1984 96 p
(NASA-TM-87398; NAS 1.15:87398; X-600-84-34) Avail: NTIS HC A05/MF A01 CSCL 03B

Magnetospherically attenuated, orbit integrated, surface incident cosmic ray fluxes of galactic origin were determined for the COBE mission. All heavy ions up to nickel (z-28) were considered in this evaluation. In order to provide worst case approximations, estimates were based on solar minimum conditions. Transport and material shielding calculations were then performed for these vehicle-encountered particles, for a simple spherical 3-D aluminum geometry, and the materially attenuated cosmic ray distributions emerging behind selected shield thicknesses were obtained. Finally, linear energy transfer (LET) spectra were evaluated for the energy spectra of each ion species and these were, in turn, integrated into the sum-total LET distribution contained herein. The results are presented in tabular and graphical form for eight different shield thicknesses from .01 to 10.0 gm/sq cm of aluminum. They show most conclusively, and not unexpectedly, that material shielding has virtually no effect on the final LET spectrum, at least not for aluminum shields. R.S.F.

N85-15224# Joint Publications Research Service, Arlington, Va.
NATURE OF SHORT-PERIOD VARIATIONS OF COSMIC RAYS IN STRATOSPHERE Abstract Only
Yu. I. Barannikov, O. A. Barsukov, and P. F. Gavrilov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 132 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 299-300 Original language document was announced in IAA as A84-31974 (For primary document see N85-15196 06-42)
Copyright. Avail: NTIS HC A08

N85-15230# Joint Publications Research Service, Arlington, Va.
DIURNAL VARIATION HARMONICS AND SPATIAL CHANGE IN COSMIC RAY FLUX Abstract Only
Yu. P. Meinikov *In its* USSR Rept.: Earth Sci. (JPRS-UES-84-007) 10 Dec. 1984 p 137 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 24, no. 2, Mar. - Apr. 1984 p 297-298 (For primary document see N85-15196 06-42)
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N85-15634*# Commissariat a l'Energie Atomique, Bordeaux (France).
ON THE RECORD OF GALACTIC COSMIC RAY FLUX AND TRAFFIC BREAK-UPS IN IRON METEORITES Abstract only
S. Regnier, B. Lavielle (California Univ., San Deigo, La Jolla), K. Marti (California Univ., San Deigo, La Jolla), and G. N. Simonoff *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

N85-15635*# California Univ., La Jolla.
THE LOW-ENERGY SECONDARY COSMIC RAY FLUX: DETECTORS IN IRON METEORITES Abstract only
S. V. S. Murty and K. Marti *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-88)
Avail: NTIS HC A10/MF A01 CSCL 03B

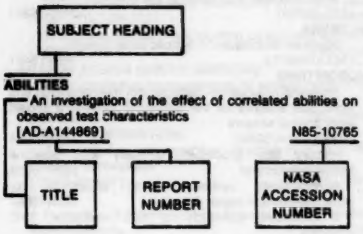
N85-15636*# Physical Research Lab., Ahmedabad (India).
SOLAR COSMIC RAY PRODUCED NEON IN LUNAR SOILS AND THEIR IMPLICATION FOR GAS-RICH METEORITE STUDIES Abstract only
C. M. Nautiyal and M. N. Rao *In* Lunar and Planetary Institute The 47th Ann. Meteoritical Soc. Meeting 1984 1 p refs (For primary document see N85-15599 06-91)
Avail: NTIS HC A10/MF A01 CSCL 03B

99 GENERAL

N85-15656# Naval Postgraduate School, Monterey, Calif.
A SUMMARY OF THE FOUNDATION RESEARCH PROGRAM Summary Report, 1 Oct. 1982 - 30 Sep. 1983
J. E. Wall Aug. 1984 81 p
(AD-A146524; NPS012-84-001PR) Avail: NTIS HC A05/MF A01 CSCL 05/1

Thirty-six projects of Independent Research/Independent Exploratory Development were funded by the NPS foundation Research Program. This research was in the areas of Computer Science, Mathematics, Administrative Sciences, Operations Research, National Security Affairs, Physics, Electrical Engineering, meteorology, Aeronautics, Oceanography and Mechanical Engineering. A tabulation in Appendix I identifies area of research and the investigator(s). The category of independent research or independent exploratory research is also identified for each research task. Author (GRA)

Typical Subject Index Listing



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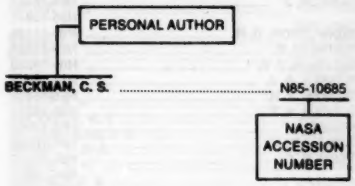

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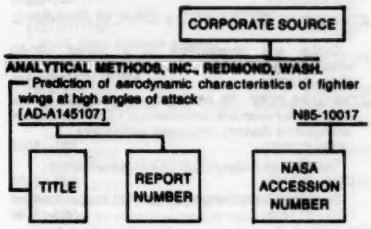

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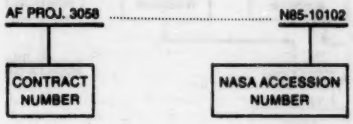

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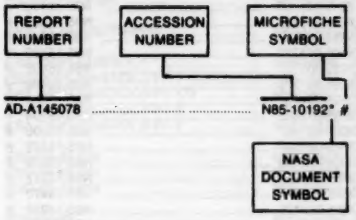

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